A Dissertation on

EVALUATION OF POSTERIOR SEGMENT PATHOLOGY USING B SCAN IN PATIENTS WITH OPAQUE MEDIA POSTED FOR CATARACT SURGERY

Submitted to the

THE TAMILNADU DR. M.G.R. MEDICAL UNIVERSITY

In partial fulfilment of the requirements

For the award of degree of

M.S. (Branch-III)

OPHTHALMOLOGY

GOVERNMENT STANLEY MEDICAL COLLEGE & HOSPITAL

THE TAMILNADU DR. M.G.R. MEDICAL UNIVERSITY,

CHENNAI, TAMILNADU

APRIL 2013

CERTIFICATE

This is to certify that study entitled "**EVALUATION OF POSTERIOR SEGMENT PATHOLOGY USING B SCAN IN PATIENTS WITH OPAQUE MEDIA POSTED FOR CATARACT SURGERY**" is the result of original work carried out by **Dr.LAKSHMI.M** under my supervision and guidance at STANLEY MEDICAL COLLEGE, CHENNAI The thesis is submitted by the candidate in partial fulfilment of the requirements for the award of **M.S Degree in ophthalmology**, course from May 2010 to April 2013 at the Stanley Medical College, Chennai.

Prof. Dr. THANGARANI,
M.S., D.O.,
Associate Professor
Department of Ophthalmology
Stanley Medical College and Hospital,
Chennai – 600 001.

Prof. Dr. K.BASKER,
M.S., D.O.,
Unit Chief & Head of the Department
Department of Ophthalmology
Stanley Medical College and Hospital,
Chennai – 600 001.

Prof. Dr. S.GEETHALAKSHMI, M.D., Ph.D.,
Dean
Stanley Medical College and Hospital, Chennai – 600 001.

DECLARATION

I hereby declare that this dissertation entitled "**EVALUATION OF POSTERIOR SEGMENT PATHOLOGY USING B SCAN IN PATIENTS WITH OPAQUE MEDIA POSTED FOR CATARACT SURGERY"** is a bonafide and genuine research work carried out by me under the guidance of **Prof. Dr.K.Basker**, M.S., D.O., HOD, Department of Ophthalmology, Government Stanley Medical College and Hospital, Chennai – 600 001.

Date: Signature

Place: **Dr. LAKSHMI. M**

ACKNOWLEDGEMENT

I express my deep gratitude to **Prof.Dr.S.GEETHALAKSHMI,** M.D.,PhD., Dean, Stanley Medical College for permitting me to do this study.

With overwhelming respect and gratitude, I thank **Prof & HOD Dr.K.BASKER, M.S, D.O**., for giving me the opportunity to work on this thesis project, his valuable advice and guidance in this endeavour. His kind attitude and encouragement have been a source of inspiration throughout this study, which helped me to do my best in this effort.

I am very grateful to **Prof. Dr.KANMANI, M.S, D.O.,** and **Prof.Dr.Thangarani. M.S., D.O.** for their continuous support and guidance.

I am very grateful to my Assistant professors **Dr.B.Meenakshi M.S**, **Dr.P.Geetha M.S, D.O.**, **Dr.S.Venkatesh M.S**, **Dr.A.Nandhini M.S.,** and **Dr.Anuradha M.S.,** for rendering their valuable suggestions, supervision throughout the progress of work.

I am thankful to all my colleagues for their support.

Finally, I am deeply indebted to all my patients for their sincere cooperation for completion of this study.

Place:

Date : **Dr.LAKSHMI. M**

INSTITUTIONAL ETHICAL COMMITTEE,
STANLEY MEDICAL COLLEGE, CHENNAI-1

Title of the Work : Evaluation of posterior segment pathology using B-Scan In patients with opaque media posted for cataract surgery

Principal Investigator : Dr. M. Lakshmi

Designation : PG in MS (Oph)

Department : Department of Ophthalmology
Government Stanley Medical College,
Chennai-1

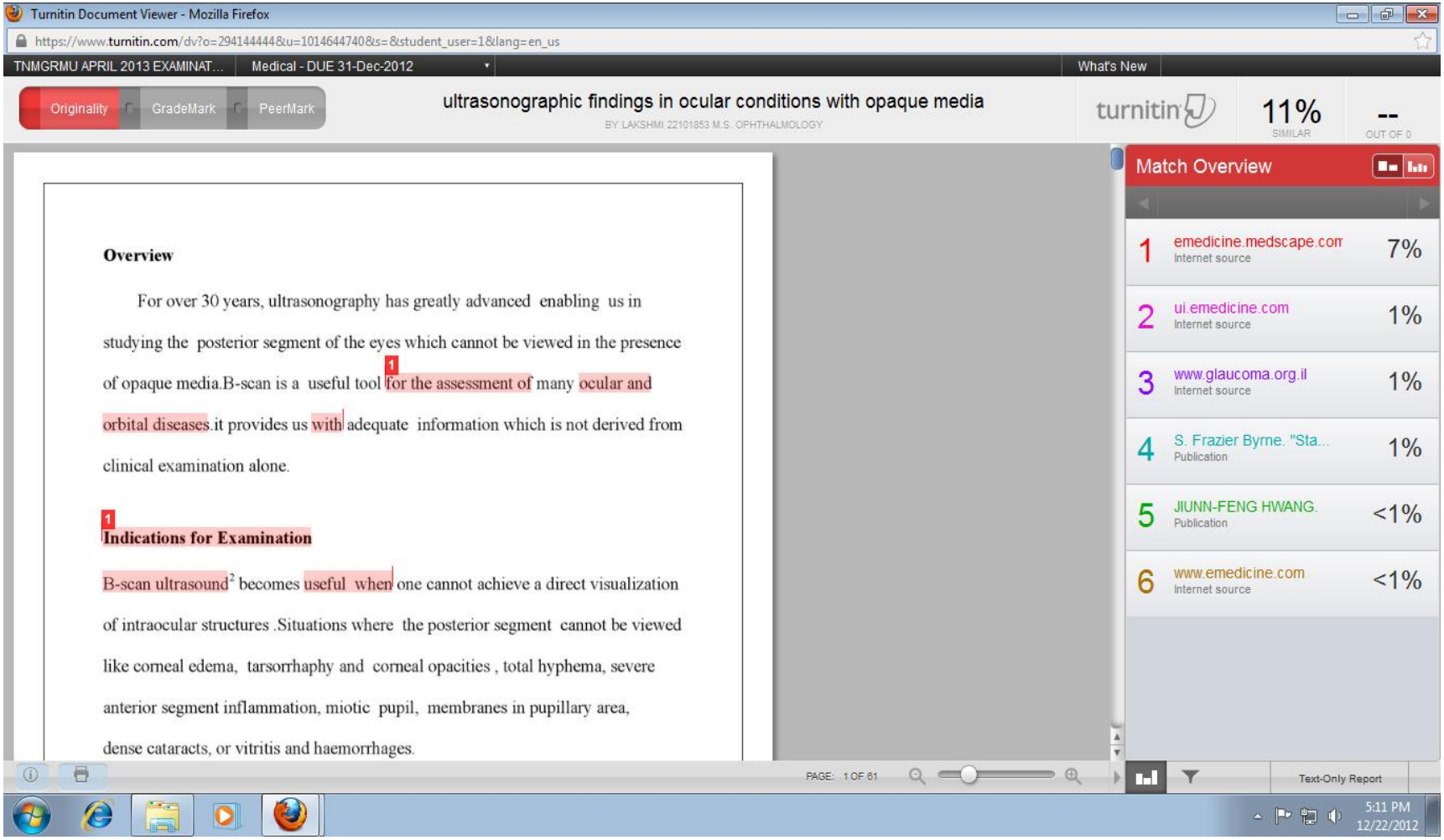
The request for an approval from the Institutional Ethical Committee (IEC) was considered on the IEC meeting held on 13.07.2012 at the Council Hall, Stanley Medical College, Chennai-1 at 2PM

The members of the Committee, the secretary and the Chairman are pleased to approve the proposed work mentioned above, submitted by the principal investigator.

The Principal investigator and their team are directed to adhere to the guidelines given below:

1. You should inform the IEC in case of changes in study procedure, site investigator investigation or guide or any other changes.
2. You should not deviate from the area of the work for which you applied for ethical clearance.
3. You should inform the IEC immediately, in case of any adverse events or serious adverse reaction.
4. You should abide to the rules and regulation of the institution(s).
5. You should complete the work within the specified period and if any extension of time is required, you should apply for permission again and do the work.
6. You should submit the summary of the work to the ethical committee on completion of the work.

MEMBER SECRETARY,
IEC, SMC, CHENNAI


Turnitin Document Viewer - Mozilla Firefox
https://www.turnitin.com/dv?o=294144444&u=1014644740&s=&student_user=1&lang=en_us
TNMGRMU APRIL 2013 EXAMINAT...
Medical - DUE 31-Dec-2012
What's New
Originality
GradeMark
PeerMark
ultrasonographic findings in ocular conditions with opaque media
BY LAKSHMI 22101853 M.S. OPHTHALMOLOGY
turnitin
11%
SIMILAR
--
OUT OF 0
Overview
For over 30 years, ultrasonography has greatly advanced enabling us in studying the posterior segment of the eyes which cannot be viewed in the presence of opaque media.B-scan is a useful tool for the assessment of many ocular and orbital diseases.it provides us with adequate information which is not derived from clinical examination alone.
Indications for Examination
B-scan ultrasound[2] becomes useful when one cannot achieve a direct visualization of intraocular structures .Situations where the posterior segment cannot be viewed like corneal edema, tarsorrhaphy and corneal opacities , total hyphema, severe anterior segment inflammation, miotic pupil, membranes in pupillary area, dense cataracts, or vitritis and haemorrhages.
PAGE: 1 OF 61
Match Overview
1 emedicine.medscape.com Internet source 7%
2 ui.emedicine.com Internet source 1%
3 www.glaucoma.org.il Internet source 1%
4 S. Frazier Byrne. "Sta... Publication 1%
5 JIUNN-FENG HWANG. Publication <1%
6 www.emedicine.com Internet source <1%
Text-Only Report
5:11 PM
12/22/2012

INDEX

PART-I

S.NO	TOPIC	P.NO
1.	INTRODUCTION	1
2.	ULTRASOUND PRINCIPLES AND PHYSICS	2
3.	METHODS OF PERFOMING SCANS	6
4.	DESCRIBING ECHOGRAMS	12
5.	REAL TIME SCANNING	14
6.	DYNAMIC SCANNING	15
7.	TECHNIQUE	17
8.	PROBE ORIENTATION	19
9.	LABELLING ECHOGRAMS	27
10.	PROTOCOL FOR A BASIC EXAM	28
11.	SCREENING TESCHNIQUE	31
12.	STRUCTURES VIEWED	32
13.	LOCALISATION OF THE MACULA	33
14.	INTRAOCULAR DISEASES	34

PART-II

1.	AIM OF STUDY	40
2.	MATERIALS AND METHODS	41
3.	INCLUSION AND EXCLUSION CRITERIA	43
4.	OBSERVATIONS	44
5.	DISCUSSION	66
6.	CONCLUSION AND SUMMARY	72

ANNEXURE

	BIBLIOGRAPHY	
	PROFORMA	
	ABBREVIATIONS	
	MASTER CHART	

PART – I

INTRODUCTION

OVERVIEW

For over 30 years, ultrasonography has greatly advanced enabling us in studying the posterior segment of the eyes which cannot be viewed in the presence of opaque media. B-scan is a useful tool for the assessment of many ocular and orbital diseases. It provides us with adequate information which is not derived from clinical examination alone[1].

INDICATIONS FOR EXAMINATION

B-scan ultrasound[2] becomes useful when one cannot achieve a direct visualization of intraocular structures .Situations where the posterior segment cannot be viewed like corneal edema, tarsorrhaphy and corneal opacities , total hyphema, severe anterior segment inflammation, miotic pupil, membranes in pupillary area, dense cataracts, or vitritis and haemorrhages.

In these cases, diagnostic B-scan can accurately image the intraocular structures and give useful information about the lens, retina, choroid, vitreous and sclera.

ULTRASOUND PRINCIPLES AND PHYSICS

Sound waves having high-frequency are transmitted from a probe to the ocular structures. These waves are reflected back to the probe and are converted to electric signals which are reconstructed to form an image .this is displayed as an image on the screen. Sound emitted as parallel, longitudinal waves is measured in hertz (Hz). The frequency is inversely proportional to the wavelength. Wavelength is directly proportional to the depth of tissue penetrated .when the wavelength is short, it penetrates less improving the resolution of the image. Ultrasound probes have a frequency of10 million oscillations per second. High-resolution probes which are used for detailed evaluation of the anterior segment have a frequency of 20-50 MHz and penetrates around 5-10 mm into the eye[3].

- **Velocity**

The velocity of waves is dependent on the density of the medium via which it travels. Sound travels faster in solids. Sound travels at a speed of 1,532 meters/second (m/s) through the vitreous and aqueous and through cornea and lens at a speed of 1,641 m/s.

- **Reflectivity**

The part of a sound wave that is reflected from the interface into the probe when sound travels from one medium to another medium are called as an echo. Its strength is directly proportional to the density. A-scan ultrasonography, images one axis of a tissue when a thin, parallel beam is emitted and it passes through the eye, and produce spikes. The strength of the echo is directly proportional to the height of the spike. The retina is denser than the vitreous.. The spike striking the interface of the vitreous and hyaloid is shorter than the spike striking the hyaloid-retinal interface.[4]

In B-scan , an oscillating beam is emitted, passing through the eye and imaging a slice of tissue, the echoes of which are represented as a multitude of dots that combine together to form an image . The brighter the dots, stronger the echoes. The dots forming the posterior vitreous membrane are not brighter than the retinal membrane. This is useful in differentiating a posterior hyaloid detachment from a high reflecting detachment of retina(a blinding condition).

- **Angle of incidence**

The angle of incidence of the probe is present for both A-scan and B-scan ultrasonography. When the probe is perpendicular to the area of interest, more echoes are directly reflected back to the probe tip and displayed. [5]When held oblique to the imaged area , part of echo is reflected away from its tip and displayed less.. When it is more oblique, the echo is weaker.

On A-scan, if the probe is placed perpendicular , the spike rises steeper from the baseline and the height of the spike increases[6]. In B-scan, when the probe is perpendicular, the dots are brighter on the corresponding surface. The shape and size of the surface and also the interface affects the reflection. . The probe should be held in a perpendicular manner to visualize a larger and flatter surface. In that case, The echo completely returns back to the probe . Part of the echo is reflected away when the a irregular surface is viewed and less echoes reach the probe. In a case of vitreous opacity much less echoes reach the probe. Perpendicularity to the area of interest must be maintained to achieve the strongest echo possible[7].

- **Absorption**

Every medium absorbs sound when it passes through it. The absorption is directly proportional to the density. The image of the posterior segment is compromised when the scan is done through a closed eye. Hence B SCAN should be performed on open eyes(except children and presence of a open wound). The patient can be made to look in various directions in an open eye than in a closed eye where the eyeball rotates upwards when a patient closes the eye. A good amount of gel-type tear solution need to be placed on the probe face before examination. Only those solutions made for ophthalmic use are used to avoid eye irritation.

A dense cataract absorbs more waves and less passes through other medium. Therefore when the probe makes contact with the sclera, it bypasses the dense cataractous lens. When calcification of tissue is present, there is more absorption and so that there is no signal posterior to the medium. Shadowing[8] is the stronger reflection of the echo which gets back to the probe when there is calcification of the tissue absorbing more signals.

BSCAN EQUIPMENT

METHODS OF PERFORMING SCANS

For over ten years now, the majority of B-scans have been performed with a probe placed in contact with the eye, whether through closed lids or directly on the globe. This is called contact scan. There are two types of immersion scans, the mini-immersion and the water bath technique[9]. There are times when both contact and immersion scans may be required in order to produce the best information about a patient's condition. One such condition is a ciliary body melanoma.

CLOSED EYE CONTACT SCANS

For years, the majority of echographers have performed their ultrasound exams with the patient's eyes closed. A copious amount of ultrasound coupling gel was placed on the closed lid and the B-scan probe was moved to different positions while the patient was asked to look in different directions. This is considered a safe method since no corneal contact is made. However safe it may be, this method has one fundamental shortcoming. The fact is the examiner never really knows the exact direction of the patient's gaze. This in turn makes localization of the pathology more challenging.

Certainly in some situations, the eye must remain closed in order for an ultrasound exam to be performed. Some of these conditions are:

- Recent trauma, surgery or open wound
- Infants and children
- One-eyed patients
- An examiner who feels uncomfortable with placing the probe directly on the globe.

OPEN EYE CONTACT SCANS

The most distinct advantage in performing scans with the eyes open is that exactly what part of the globe is being examined is known. The additional value in this technique is that with the lids out of the way, more sound energy is being transmitted into the eye. The fat in the lids absorbs and attenuates the sound right from the start, and avoiding this will result in slightly more resolution in the image[10].

MINI-IMMERSION SCANS

The mini-immersion technique utilizes a scleral shell. The reasoning behind this technique is that the optimal area of focus for the B-scan sound beam is between 10 and 30mm from the probe tip[11]. It is in this focal zone that the area of interest should be imaged.

With the conventional methods of contact scanning, this focal zone of the sound beam would be too far posteriorly, providing a less than optimal image of the anterior segment. In order to bring the tissue into the focal zone, the probe needs to be farther away from the eye.

The use of a scleral shell filled to the brim with sterile methylcellulose allows the examiner to move the probe tip to the correct position. Now the anterior segment structures will be within the zone of maximum resolution, 10 to 30 mm.

Mini-immersion scans are used in the special case of such pathologies as iris cyst, ruptured lens capsule, and ciliary body melanoma[12]. On the screen, the image of the eye will be shifted to the right with the anterior segment echoes located approximately in the middle. In the contact method, the anterior segment echo patterns are at the left edge of the screen and the area of interest, the vitreo-retinal interface, is in the center of the screen.

WATER BATH IMMERSION SCANS

This technique was the original method by which ophthalmic scans were performed. The patient lies flat while a large drape is glued to the forehead, the side of the nose, the upper cheekbone and the temple areas around the eye. The top of the drape is held in a ring stand. A lid speculum holds the lids away from the anesthetized cornea and about one liter of saline warmed to body temperature is gently poured into the watertight setup. With the saline in place, the transducer crystal which is held by a mechanical apparatus is lowered into the fluid to the desired depth[13].

One of the advantages of this system is that it allows the greatest latitude in changing the distance between the transducer and the eye, thereby positioning the tissue within the area of maximum resolution.

Once the transducer is in position in the saline, the examiner must move the crystal back and forth by hand with a small lever. There is no motorized probe here, just the crystal itself. This sweeping motion "paints" an image on a screen which may be photographed if desired. When the scanning has been completed, the drape is punctured to allow

the saline to drain into a basin. The Speculum is removed and the drape peeled off from around the eye[14].

Although these images have a brightness and crisp clarity about them which is appealing, they do lack gray scale which makes subtle echoes difficult to differentiate from strong ones.

DESCRIBING ECHOGRAMS

The display of wide variety of intensities from black to white is called gray scale. This range of echo intensities provides additional information about the tissues that reflected the sound.

Bright echoes are called strong reflectors and can also be described as being produced by a strong echo source. Dim echoes therefore come from weak echo sources. Another way of describing these echo patterns is in terms of internal reflectivity. When a lesion is imaged, for example, the appearance of the echoes from inside the tumor are of clinical significance[15]. A tumor with bright echoes is said to have high internal reflectivity. Dim echoes within a tumor indicate low internal reflectivity. The level of gain will have an effect on whether the echoes are bright or dim, so the relative gain value must also be taken into consideration.

An area of a scan may also be referred to as being empty, Two commonly used terms are echolucent or acoustically clear.

There are many additional facets to describing the appearance of B-Scan images which vary from one pathology to another. As additional reference materials are studied and pathologies examined, further details will become incorporated into your store of knowledge.

REAL TIME SCANNING

The concept of real time is the idea that when the probe or the eye moves, the images moves at the same time. Another way of starting this is that there is no discernable delay between the probe or eye movement and the behavior of the image on the screen.

Some B-scan instruments have probes whose transducers move relatively slowly. This makes real time evaluations slightly more difficult but still possible once the characteristics of the equipment are understood. For these units, the examiner must slow down the probe movements so that the changes on the screen can be evaluated more readily[16].

DYNAMIC SCANNING

In addition to the brightness or dimness of echoes, the way they move provides important clues to the nature of the tissue which produced the image. This is the idea behind dynamic scanning. This basically means that while holding the probe stationary, the technician asks the patient to look to a new fixation target then back again. By observing the screen during eye movements, it is possible to evaluate the way in which a structure moves.

For example, when the eye moves, a vitreous membrane whips around on the screen rather quickly. A retinal detachment, however, has an undulating though some what restricted motion. In fact, even a total retinal detachment is still attached at the optic nerve and the ora serrata[17].

Another form of movement that is seen during dynamic scans is the vascularity of a lesion, particularly a melanoma. When the B-scan probe is held still while imaging a large melanoma, it is sometimes possible to see the pulsations of the vascular supply from within the tumor during real time scanning.

A very interesting display of dynamic imaging can be observed when convection currents move particles around in the vitreous. The blood cells from a fresh hemorrhage in a vitrectomized eye gently move on their own while the probe is held still. The calcium lipid opacities that are present in a case of asteroid hyalosis are also known to move on their own as a result of convection currents[18].

It requires a very sensitive instrument with high gain in order to see a fresh hemorrhage clearly. In a vitrectomized eye it is even more difficult to see. However, the asteroid bodies are highly reflective due to the presence of calcium, consequently, the image is easily seen even at lowered gain levels.

METHOD OF PERFORMING BSCAN

TECHNIQUES

A most important goal of any scanning technique is to perform examinations in a consistent manner. This gives a thorough and accurate observation of all parts of the globe and orbit. This is done by performing each echographic examination in the same manner, beginning with one particular probe position and moving on to others. In this way, there will not be a concern that something might have been over-looked. The fear of missing a pathology is a valid one to have. Using a systematic approach, will give a adequate and proper examination[19].

INSTRUMENTATION

Ultrasound instruments use a pulse-echo system, which consists of a series of emitted pulses of sound, each one followed by a brief pause (microseconds) for the receiving of echoes and is processed on the display screen. The amplification of the display is altered by adjusting the gain, measured in decibels (dB). Adjusting the gain does not change the frequency or velocity of the wave but it changes the sensitivity of the instrument's display screen. When the gain is high, weaker signals like vitreous opacities and posterior vitreous

detachments are noted. When the gain is low, the stronger echoes like retina are visualized. , However, there is better resolution of the area scanned when the gain is lowered. Typically, all examinations must begin on highest gain so that the weak signals are not missed.After that the gain is reduced to see the stronger signals[20].

B SCAN PROBE

PROBE ORIENTATION

The key point is that the marker on the probe indicates the top of the display screen. Each B-scan probe will have a marker, usually a white line near the tip. The transducer inside the probe oscillates back and forth, toward and away from this mark. As it pivots inside the probe, the transducer generates a fan of sound waves, similar to how a slit lamp produces a thin sector of light.

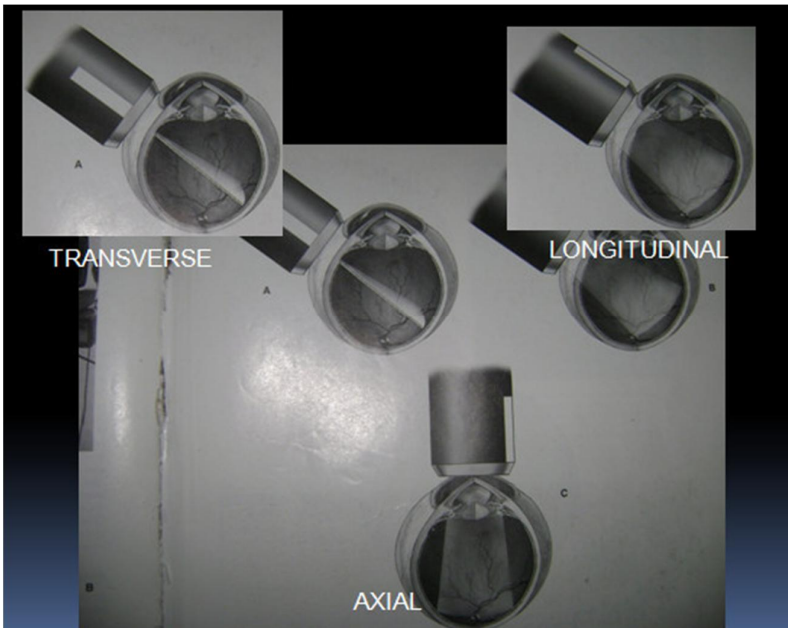
When the white mark on the probe is directed vertically toward the patient's brow, or superiorly, the scan orientation is superior/inferior. This is called a vertical transverse scan. Since the mark is up, the screen now displays a sector scan showing superior retina on the top and inferior retina on the bottom.

The image in the center has the most resolution and this is where the center of any unknown pathology lies. If the probe tip is placed on the 9.00 limbus, then the tissue directly across from the probe is at the 3:00 position. Therefore, to examine the 3:00 position in the globe, the probe is placed at 9:00. Once in the 9:00 position, the probe is shifted into the fornix so that the 3:00 meridian is scanned from anterior to

posterior. Wherever the probe is placed on the eye, the area being scanned lies opposite[21].

When the probe is on the limbus, the sound beam is being directed posteriorly toward the disk. As the probe is shifted into the fornix, the scan plane moves more anteriorly. This is true for either the horizontal or vertical transverse positions.

B SCAN PROBE positions



HORIZONTAL TRANSVERSE

Convention usually calls for the orientation mark to be directed toward the nose for both the right and left eye examinations. Since the top of the screen corresponds with the mark on the probe, the top of the scan on any horizontal transverse scan is nasal retina and the bottom of the scan is temporal retina.

If the center of the probe is placed on the 6:00 limbus, for example, the center of the horizontal scan displayed will be 12:00. This meridian may then be scanned from anterior to posterior by shifting the probe from the limbus into the fornix.

The horizontal transverse scan is a particularly useful one when documenting the macula. Think of the sound beam being directed toward the optic disk when the white mark on the probe is toward the nose. The displayed scan is nasal on top, temporal on the bottom.

If the macula is temporal to the disc and the disc is in the center of the image when the temporal retina is at the bottom of the screen, then the macula will be just below the optic nerve on the image.

The macula can also be imaged from many other probe positions. However, having the optic nerve shadow as a point of reference makes

the job much easier. A long section of the optic nerve appears on the screen as a shadow, or lack of echoes, extending posteriorly from the retina. This is due to the high reflectivity of the disc. In cross section, the optic nerve appears as a dark circle.

OBLIQUE

In the oblique scan angle, it is anywhere between vertical and horizontal. In this scan, the probe may be placed on any clock hour, with the orientation mark as superior as possible. The resulting scan will be produced from the portion of the eye opposite the probe. If the probe is placed at the 7:30 position on the limbus of the left eye and the white mark is up, the top of the screen will be superonasal and the bottom of the screen will be infero-temporal, Since the probe was placed at 7:30 meridian.

From the orientation mark which determines the scan plane, any unusual scan angle may be used to observe the position of the patient's eye in order to determine from where the image is produced.

LONGITUDINAL

A longitudinal scan is created a bit differently from the basic transverse scans. The purpose of this scan position is to show the anterior/posterior extent of a structure or pathology. The other types of scans show the up/down and right/left extent of a tissue[22].

With this scan, the probe's orientation mark is always directed toward the limbus of the cornea. The transducer now swings back and forth in an anterior/posterior fashion. When creating such an image, the goal is to display the optic nerve shadow on the very bottom edge of the screen. The top of the scan will therefore be the ciliary body region. Slight probe movements can be made to adjust the image to show these structures.

It is used to imaging the ciliary body and determining the anterior/posterior extent of a lesion or detachment.

AXIAL

The axial B-scan is one where the probe is placed directly over the cornea. The posterior lens surface and the optic nerve shadow are in the center of the image. In a vertical axial view, the top of the screen is superior and the bottom of the screen is inferior. In this view, the optic nerve is visualized. The label for this scan is vertical axial even though the scan plane through the nerve is not really the visual axis of the eye since the macula is temporal to the disk. The visual axis of the eye includes the macula[23].

The horizontal axial scan is produced by again placing the probe over the cornea and having the marker directed toward the nose. This horizontal transverse scan plane shows the macula in relation to the optic nerve.

The difference between axial scans and the other transverse scans is that the axial scan is directed through the central cornea and lens. All other B-scans are performed so as to carefully avoid sending the sound beam through the lens unless it is the lens itself which is being studied.

Changes in the velocity and refraction of the sound beam make it inappropriate to make judgments about the area of the retina which lies

behind the imaged lens. Clinical evaluations of the retina are never made when scanning through the lens. They are made by using the various transverse and longitudinal scan angles.

The main purpose of axial scans is to provide an image with recognizable landmarks in the area of the visual axis. The horizontal scan plane can be particularly useful since it images the macula[24].

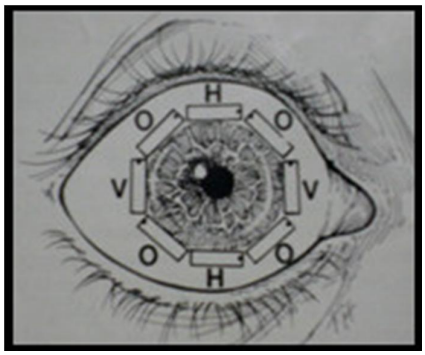
LABELLING ECHOGRAMS

Proper labeling and documentation is essential. The first step in labeling a photo is to note the basic probe orientation as transverse (T) or longitudinal (L). Axial scans are labeled either as vertical axial (VAX) or horizontal axial (HAX). The second step is to label the center of the B-scan image. When the probe is placed horizontally at the 6:00 limbus, and therefore aimed posteriorly at the 12:00 meridian, then the label will be 12:00 P for 12:00 posterior.

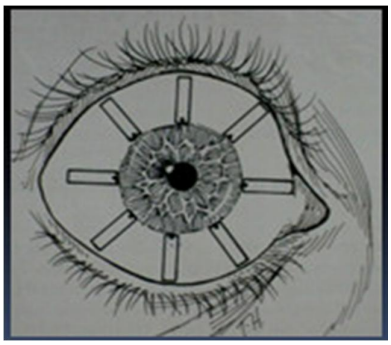
It will also be evident from the label that this is a horizontal transverse scan, since that is the only probe position where the 12:00 meridian can be centered in the scan. If the transducer is at the 12:00 meridian in the center of its swing, then it is at the 9.00 point at the top of the screen and the 3.00 area at the bottom of the screen.

Let's say that the probe is now in a vertical orientation, with the center of the probe placed close to the 3.00 equatorial region of the globe as the patient looks away from the probe in extreme gaze. The probe is directed toward the 9:00 meridian, and the sound beam is shifted anteriorly as the probe moves more posteriorly. Since the beam is now directed across the eye at the equator, the label would be 9:00 E for 9:00 equator[25].

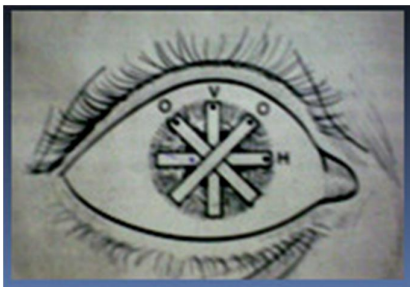
TRANSVERSE



LONGITUDINAL



AXIAL



PROTOCOL FOR A BASIC EXAM

There are six basic probe positions which make up the protocol. If a pathology is detected during the exam, other positions such as the longitudinal and oblique scans should follow.

- **Position #1** is horizontal transverse with the probe marker directed nasally. The patient is instructed to look up as high as possible and the probe is placed at the 6:00 limbus. As the probe is slowly moved into the lower fornix, the angle of the tip is adjusted so that the probe face stays in contact with the globe. The posterior superior aspect of the globe is imaged with these scans.

- **Position #2** is vertical transverse with the probe marker directed superiorly. The patient is instructed to look nasally and the probe is placed on the temporal limbus. As the probe is moved into the lateral fornix, the nasal aspect of the globe is examined.

- **Position #3** is horizontal transverse with the probe marker directed nasally. The patient is directed to look down and the

probe is placed on the 12:00 limbus. As the probe is moved into the upper fornix, the inferior aspect of the globe is shown .

- **Position # 4** is vertical transverse with the probe marker directed superiorly. The patient is instructed to look temporally and the probe is placed on the nasal limbus. As the probe is moved into the medial fornix, the temporal aspect of the globe is displayed.

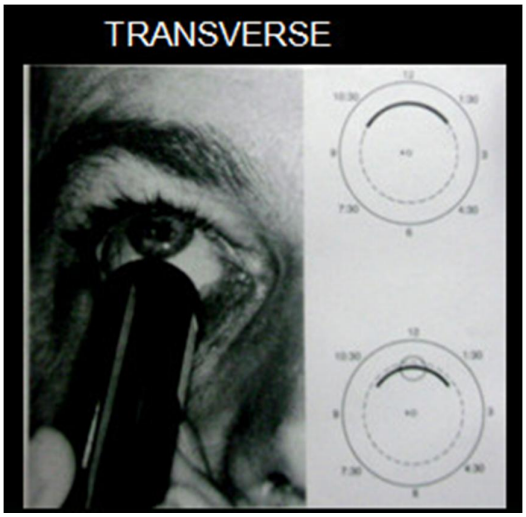
- **Position # 5** is vertical axial with the probe market directed superiorly. The patient is told to look in primary gaze and the probe is gently placed over the cornea with ample coupling gel. The scan should display the cornea, posterior lens and optic nerve shadow surrounded by orbital fat. The lens echo and the nerve shadow should be centered in the display. Remember that the vertical axial view does not image the macula.

- **Position # 6** is horizontal axial with the probe marker directed nasally. The patient is again fixating in primary gaze and an image of the cornea, lens and posterior structures will be displayed. Center the posterior lens echo and the nerve shadow.

This is the scan that will image the macula, just below the nerve shadow on the screen.

If a pathology is noted during this initial exam, then additional scan angles will be necessary in order to determine the extent and exact position of the structures. The pathology or area of interest must be centered in the B-scan display in order to obtain the best resolution of the image. The probe must be positioned in whichever way is required to achieve this goal.

After all the scan angles have been completed, the ones that best represent the areas of interest is documented. The photos are labelled in a consistent manner and filed with the patient's chart. If additional ultrasound exams are required at a later date, photos from the first exam for reference are taken[26].


TRANSVERSE

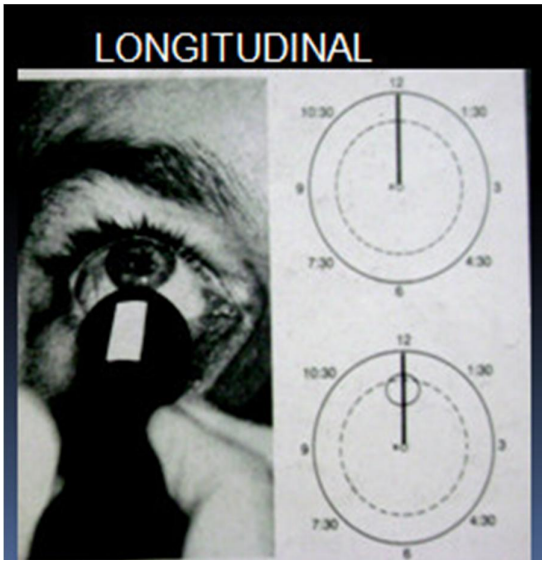
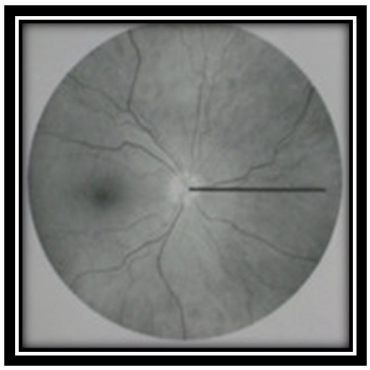

LONGITUDINAL

TABLE 1:SCREENING TECHNIQUE

Clock hour-probe position	Clock area-area screened
3-Limbus	9-Posterior
3-Equator	9-Equator
3-Fornix	9-Enterior
6-Limbus	12-Posterior
6-Equator	12-Equator
6-Fornix	12-Anterior

TRANSVERSE

LONGITUDINAL



AXIAL

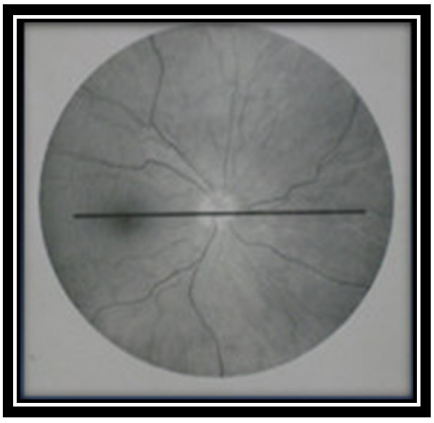


TABLE 2:STRUCTURES VIEWED

Scan	Probe position	Aspect viewed
Horizontal transverse	6-Limbus	Postero superior
Vertical transverse	Temporal limbus	Nasal
Horizontal transverse	12-Limbus	Inferior
Vertical transverse	Nasal limbus	Temporal
Vertical axial	Primary gaze	Cornea,post lens,optic nerve
Horizontal axial	Primary gaze	Macula imaged below optic nerve

TABLE 3:LOCALISATION OF THE MACULA

Longitudinal (LMAC)	Temporal	Nasal sclera	Limbus	Nerve at bottom,macula superiorly
Transverse (TMAC)	Temporal	Nasal sclera	12-o'clock	Macula visualized at the 9-o'clock position at the posterior pole in right eye & vice versa
Vertical (VMAC)		corneal vertex	12-o'clock position	The nerve will not appear
Horizontal (HMAC)		corneal vertex	Nasal	The macula will be centered to the right

INTRAOCULAR DISEASES

- **Vitreous**

The vitreous is echolucent In the case of young individuals. As the eye undergoes aging, the vitreous starts undergoing syneresis, and low reflective vitreous opacities can be found. Posterior vitreous detachment which is a benign condition of the aging eye is represented as a mobile, thin, low reflective line on B-scan.

In Asteroid hyalosis, a benign condition of the vitreous , calcium salts accumulate in the vitreous can be easily detected with ultrasound . This calcium salts produce, highly reflective vitreous seen as multiple pin point dots in vitreous.

Vitreous hemorrhage can occur following after trauma or along with a retinal tear or as a complication diabetes mellitus or a central retinal vein occlusion. The patterns of echoes displayed in a vitreous hemorrhage depends on its age and the severity. Fresh vitreous hemorrhages appears as low reflective mobile vitreous opacities characterized by small dots as compared to older hemorrhages where organized blood and membranes are found. Large interfaces are formed by the membranes that are seen echo graphically as a vitreous

with numerous large opacities of higher reflectivity. Gravitational forces cause vitreous hemorrhages to settle down inferiorly[27]. After trauma , Membranes are formed mainly after penetration or perforation of eye injuries. Membranous tracks are formed along the path of the object. This track ends in the vitreous cavity In penetrating injuries. It can also make an impact on the site opposite to the entry site. The track spans the eye from the entry to the exit site perforating injuries. The track is followed which leads to an intraocular foreign body or a retinal tear at the site of impact. Intraocular foreign bodies can be found with ultrasound.

RETINA

longitudinal approaches are used to detect retinal tears. In situations where the retinal tears are present with vitreous hemorrhages, visualization of etiologic tear is difficult. One can see the posterior vitreous hyaloid or a vitreous strand attachment to the retinal flap in these cases. They are seen in the far periphery, where vitreous attachment to the retinal surface is very firm(supero temporally).it is accompanied by a shallow cuff of the sub retinal fluid .

The retinal detachment is a highly reflective, undulating membrane. In total retinal detachments, the folded surface is attached to the ora serrata anteriorly and posteriorly to the optic nerve .Initially, it is relatively mobile. Later as it progresses to , proliferative vitreoretinopathy, the retina becomes stiff and has a funnel shaped configuration [28]

Retinoschisis is seen as a focal, smooth,thin, dome-shaped abnormality.

In Retinoblastoma, areas of calcification are present inside the tumor as multiple foci. Calcium is represented as highly reflective foci within the tumor.

The tumors are relatively smooth, dome shaped, with low to medium internal reflectivity initially. As the tumor advances, it becomes and highly reflective due to the increase in the amount of calcium.. Baseline size of the tumor and locations are obtained, and these are the parameters that are monitored closely during and even after treatment.

Other conditions like Coat's disease, retinopathy of prematurity, persistent hyperplastic vitreous are detected using B scan.

- **Choroid**

Double spikes on diagnostic A-scan is seen when retina is apposed to choroid. The vitreoretinal interface shows a highly reflective spike, and a slightly less reflective spike is shown by the retinochoroidal interface. A choroidal detachment can be due to trauma or surgery. the detachment appears generally to be smooth, dome-shaped, and thick with no after movements. When extensive, multiple detachments known as kissing choroids are seen. In haemorrhagic detachments large number of hyperechoeic dots are seen .

The malignant melanoma of the choroid appears as a homogenous, smooth, dome shaped elevation. Acoustic hollowing is the internal sound attenuation which has a low reflectivity at the tumor base Posterior extrascleral extensions can be identified. This information helps in management of decision and explaining the prognosis[29].

Choroidal hemangioma is dome-shaped with very high internal reflectivity. An overlying serous retinal detachment can also be found.

Calcific choroidal tumors have a high internal reflectivity due to the calcium and can be easily detected.. Marked shadowing is present in these tumours[30].

- C**iliary body**

The ciliary body is visualized with high-resolution scanning. A ciliary body detachment.has a low-to-medium reflective cleft seen in the subciliary space.ciliary body melanomas can also be identified.

- **Sclera**

Scleral thickening present in nanophthalmos , phthisis bulbi, and in cases of scleritis.scleritis can be mild to moderate or focal to diffuse. It presents as a T-sign when posterior and adjacent to the optic nerve.

Myopes have focal areas of sclera thinning forming staphylomas, or out-pouching. sclera ruptures are also identified with their ecographic patterns.

- **Optic nerve**

Optic nerve colobomas are detected with ultrasound.

Optic disc drusens presents as highly reflective calcific nodules in the optic nerve head tumours. Crescent sign., an echolucent circle within the optic nerve sheath is present in cases of papilledema.

An optic nerve glioma has a low-to-medium and also regular internal reflectivity An optic nerve sheath Meningioma has a medium-to-high but irregular internal reflectivity with calcification[31].

PART - II

AIM OF THE STUDY

To evaluate the posterior segment pathology using B-scan ultrasonogram in patients with opaque media posted for cataract surgery which would be of help in planning for surgical intervention and to assess post operative visual prognosis.

MATERIALS & METHODS

This prospective diagnostic study was conducted in patients presenting to department of ophthalmology, Stanley Medical College diagnosed with dense cataract and were evaluated for posterior segment pathology using B-scan ultrasonogram. No. of patients in this study were 500. Importance of ocular evaluation explained to the patients, Evaluation procedure was also explained and an informed consent obtained. After obtaining consent, history and systemic examination was conducted. Visual acquity,slit lamp examination and tension were recorded.Duration of the study is two years.(August 2010-July 2012)

Detailed history and ocular examination, like slit lamp and tonometry were done in 500 patients with dense lens changes posted for cataract surgery.. the procedure was explained briefly to the patient for their co-operation. B Scan Ultrasound (Sono Med) with a probe with direct contact was used.

Ultrasonic probe was placed over the globe of the closed eye.after.liberal amount of gel is applied over the probe.then anterio-posterior, longitudinal and transverse views of B-scan along with A-scan were taken. High gain (80 to 90dB) and low gain (60 to 70dB) sensitivity were selected during ultrasonography and the images were documented.

INCLUSION CRITERIA

I. Any age group

II. Both sex

III. no other media opacities due to anterior segment pathologies

IV. In patients where fundus cannot be viewed by ophthalmoscopy

V. patients already not having any posterior segment pathology

EXCLUSION CRITERIA

I. Patients already having posterior pathology

II. In patients where fundus can be viewed by ophthalmoscopy.

III. Media opacities due to other anterior segment pathology.

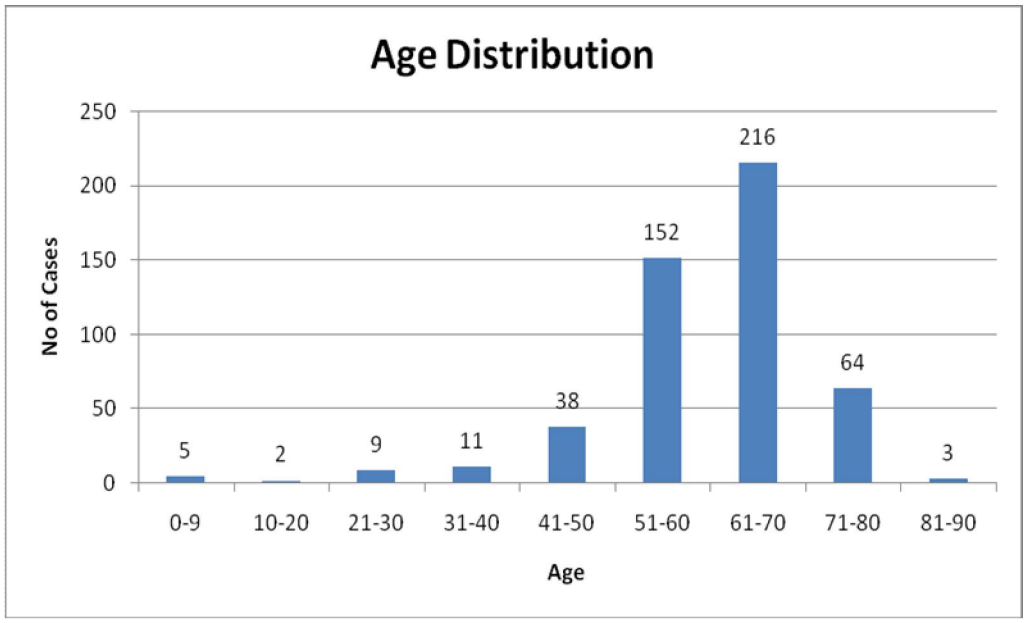
OBSERVATIONS

TABLE 1a: AGE DISTRIBUTION

AGE	CASES	%
0-9	5	1
10-20	2	0.4
21-30	9	1.8
31-40	11	2.2
41-50	38	7.6
51-60	152	30.4
61-70	216	43.2
71-80	64	12.8
81-90	3	0.6

In this study maximum patients of 43.2% were in age group of 61-70 yrs followed by 30.4% in age group of 51-60 yrs followed by 12.8% in 71-80 yrs group and 0.4%of patients in 10-20 yrs group being least common.

FIGURE 1b : BAR CHART SHOWING AGE DISTRIBUTION



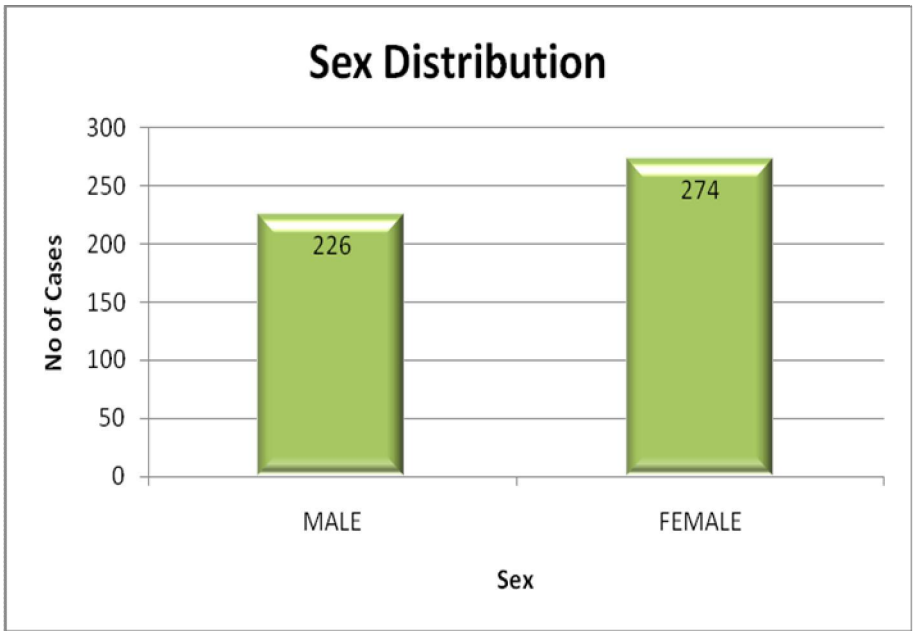
Of 500 patients studied 216 were in 61-70 yrs age group followed by 152 in 51-60 yrs group followed by 64 in 71-80yrs age group followed by 38 in 41-50yrs age group with least number of 2 patients in 10-20yrs.

TABLE 2a: SEX DISTRIBUTION

SEX	NO.	%
MALE	226	45.2
FEMALE	274	54.8

In this study female patients accounted for 54.8% patients and 45.2% patients accounted for male.

FIGURE 2b: BAR CHART SHOWING SEX DISTRIBUTION



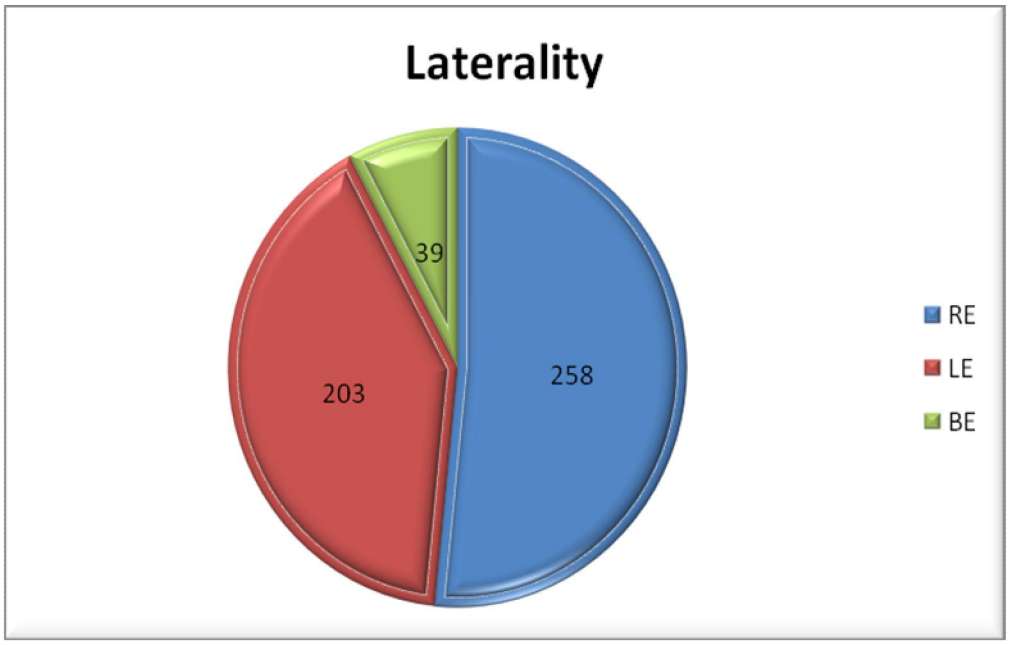
Of 500 patients in this study 274 patients were female and 226 patients were male.

TABLE 3a: LATERALITY

LATERALITY	NO.	%
RE	258	51.6
LE	203	40.6
BE	39	7.8

In this study 51.6% patients had dense lens changes in right eye, 40.6% patients had dense lens changes in left eye and 7.8% patients had bilateral cataract.

FIGURE 3b: LATERALITY



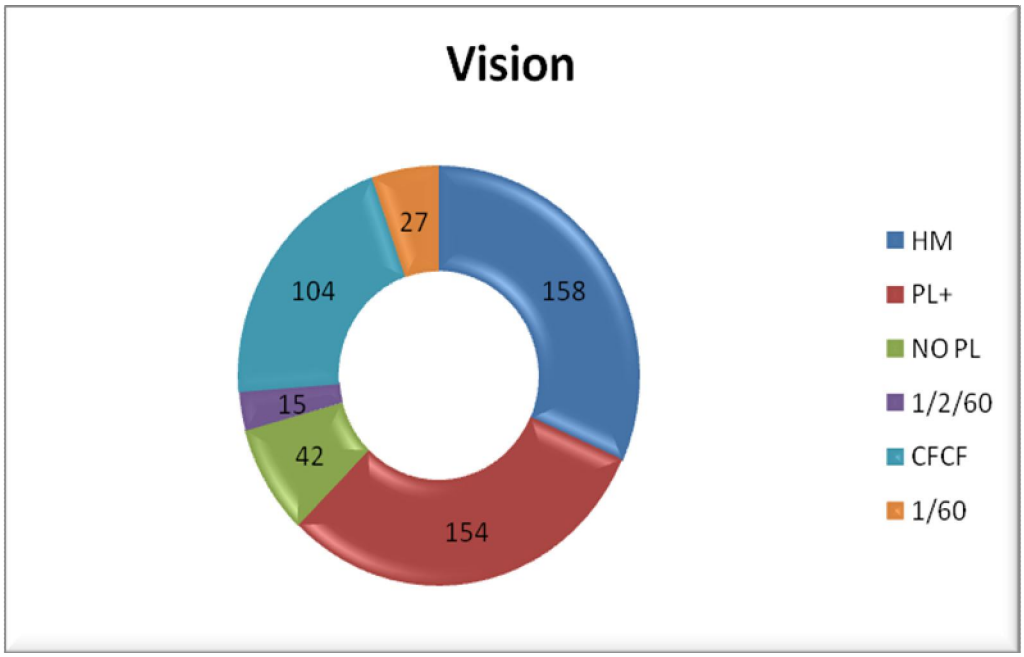
Of 500 patients in this study 258 patients had dense lens changes in right eye followed by 203 patients with dense lens changes in left eye and 39 patients with bilateral lens changes.

TABLE 4a: VISION

VISION	NO.	%
Hand Movements	158	31.6
Perception Of Light+	154	30.8
No perception of light	42	8.4
1/2/60	15	3
Counting fingers close to face	104	20.8
1/60	27	5.4

In this study 31.6% patients had vision of hand movements followed by 30.8% patients with perception of light , 20.8% patients with CFCF , 8.4% patients with no perception of light , 5.4% patients with vision of 1/60 and 3% patients with ½ /60.

FIGURE 4b: VISION



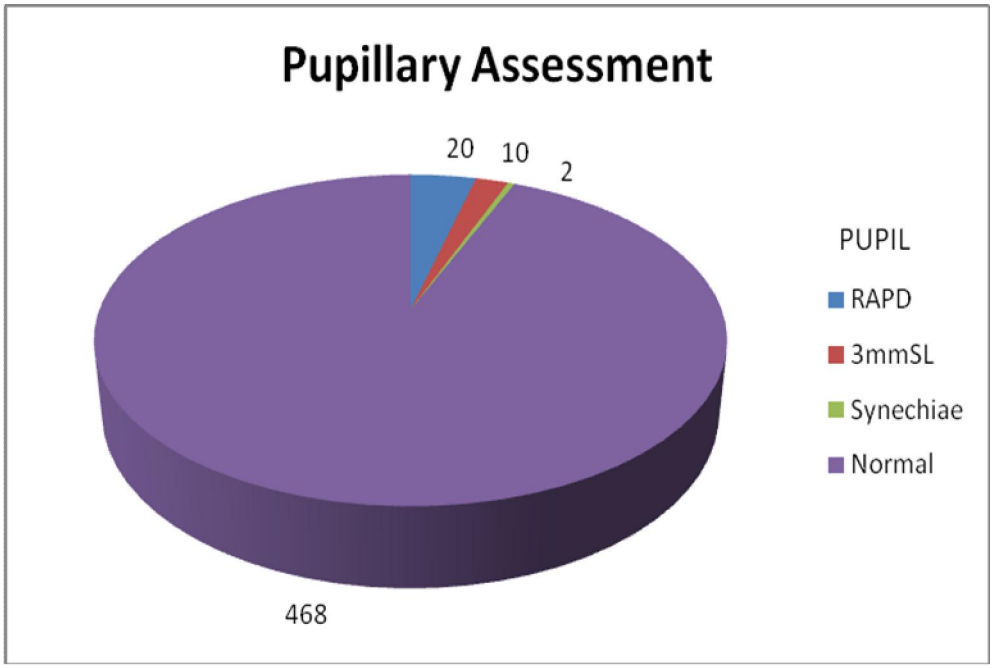
Of 500 studied 158 patients had a vision of hand movements followed by 104 patients with CFCF, 42 patients had no perception of light , 27 patients had a vision of 1/60 and 15 patients had a vision of ½ /60.

TABLE 5a: PUPILLARY ASSESSMENT IN THE STUDY GROUP

PUPIL	NO.	%
Relative Afferent Pupillary Defect	20	4
3mm Sluggishly reacting to light	10	2
Synechiae	2	0.4
Normal	468	93.6

In this study, 93.6% patients had normal pupil followed by 4% patients with relative papillary afferent defect followed by 2% patients with 3mm sluggishly reacting pupil followed by 0.4% patients with synechiae.

FIGURE 5b:PIE CHART SHOWING PUPILLARY ASSESSMENT

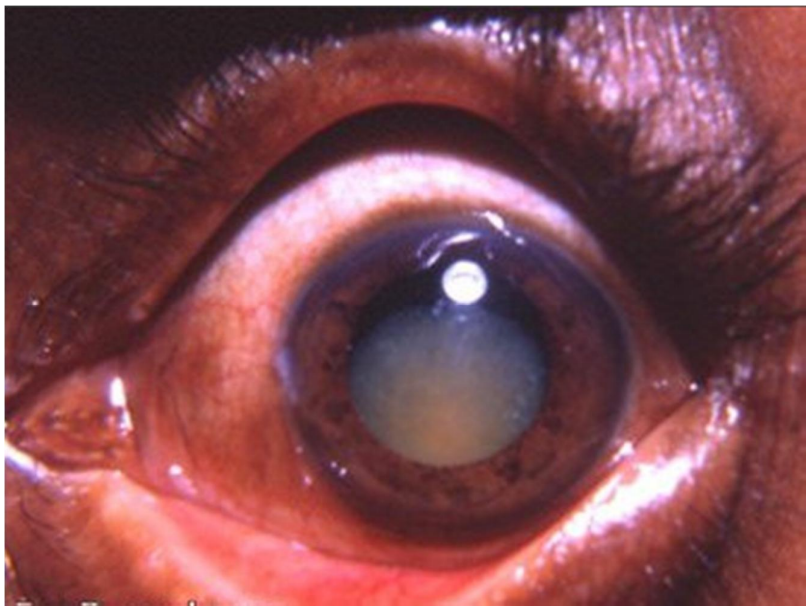


Of 500 patients studied 468 had normal pupil followed by 20 Patients with Relative afferent papillary defect , 10 Patients with 3mm sluggishly reacting pupil and 2 Patients had synechiae in the pupillary area.

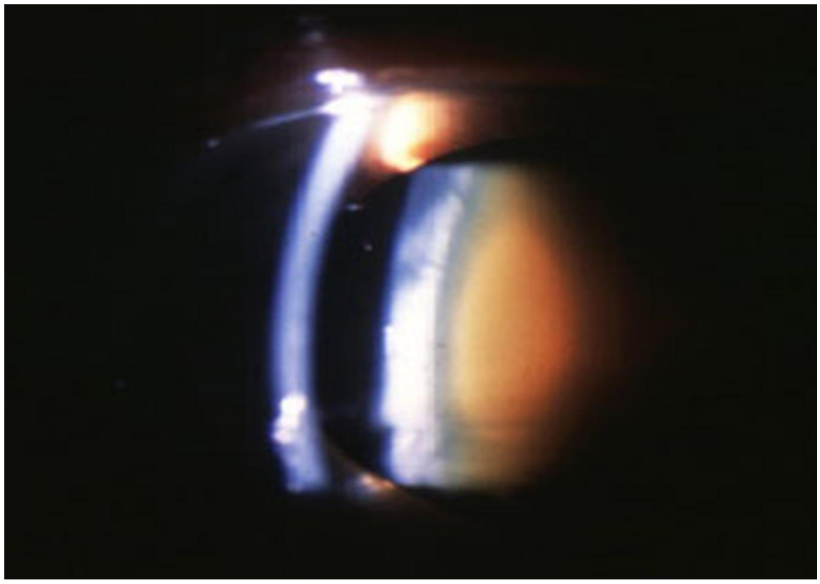
MATURE CATARACT

TRAUMATIC CATARACT

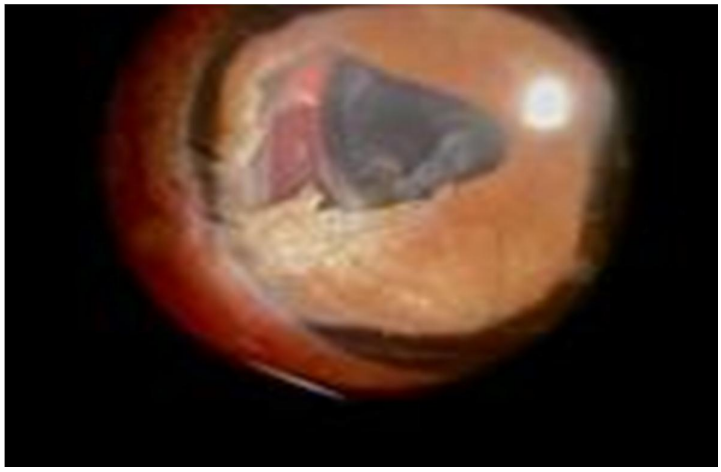
HYPERMATURE CATARACT



NUCLEAR SCLEROSIS GRADE IV



COMPLICATED CATARACT



CONGENITAL CATARACT

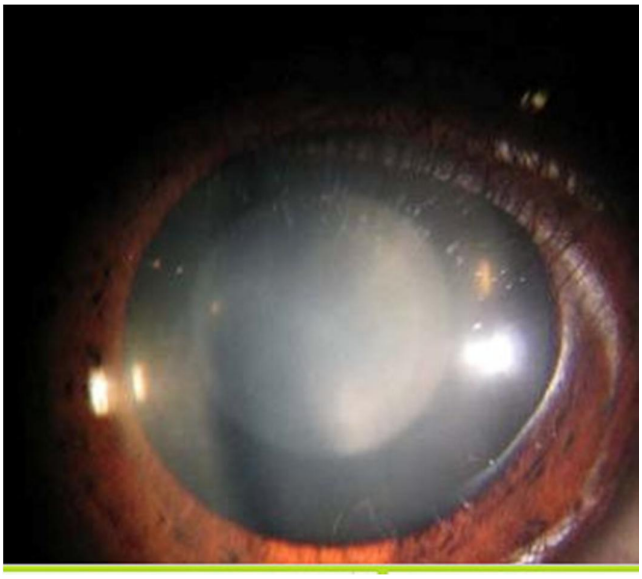
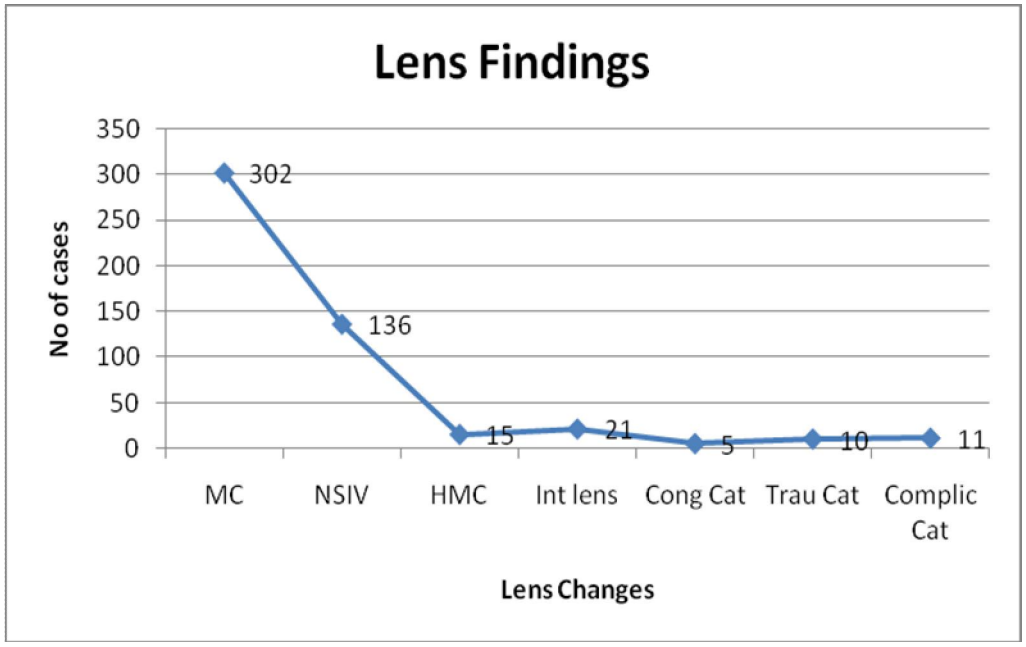


TABLE 6a: DISTRIBUTION OF LENS CHANGES

LENS CHANGES	**NO.**	**%**
Mature Cataract	302	60.4
Nuclear Sclerosis IV	136	27.2
Hypermature Cataract	15	3
Intumescent lens	21	4.2
Congenital Cataract	5	1
Traumatic Cataract	10	2
Complicated Cataract	11	2.2

In this study 60.4% patients had mature cataract followed by 27.2% patients with Nuclear sclerosis grade IV, 4.2% patients with intumescent lens followed by 3% with hypermature cataract followed by 2.2% patients with complicated cataract followed by 2% patients with traumatic cataract and 1% patients had congenital cataract.

FIGURE 6b:LINE CHART SHOWING DISTRIBUTION OF LENS CHANGES



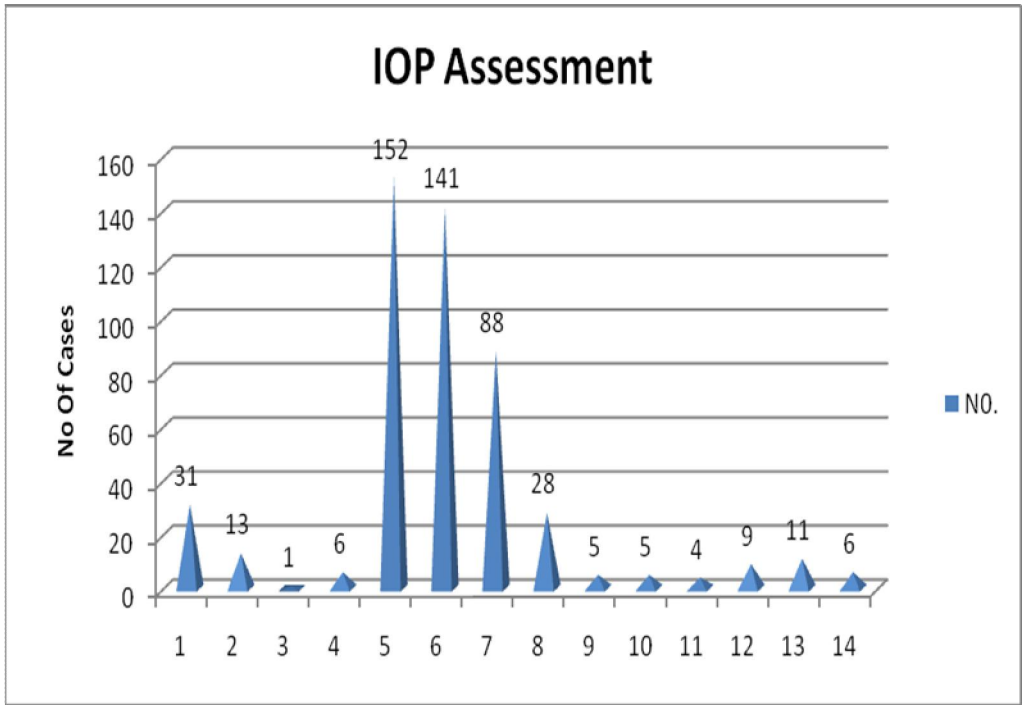
Of 500 patients studied ,302 patients had mature cataract followed by 136 patients had Nuclear Sclerosis Grade IV, 21 patients had intumescent lens, 15 patients had hypermature cataract, 11 patients had complicated cataract.10 patients with traumatic cataract and 5 patients with congenital cataract was recorded.

TABLE 7a: DISTRIBUTION OF INTRAOULAR PRESSURE IN THE STUDY GROUP

IOP	N0.	%
4	31	6.2
6	13	2.6
8	1	0.2
10	6	1.2
12	152	30.4
14	141	28.2
16	88	17.6
18	28	5.6
20	5	1
22	5	1
24	4	0.8
26	9	1.8
28	11	2.2
30	6	1.2

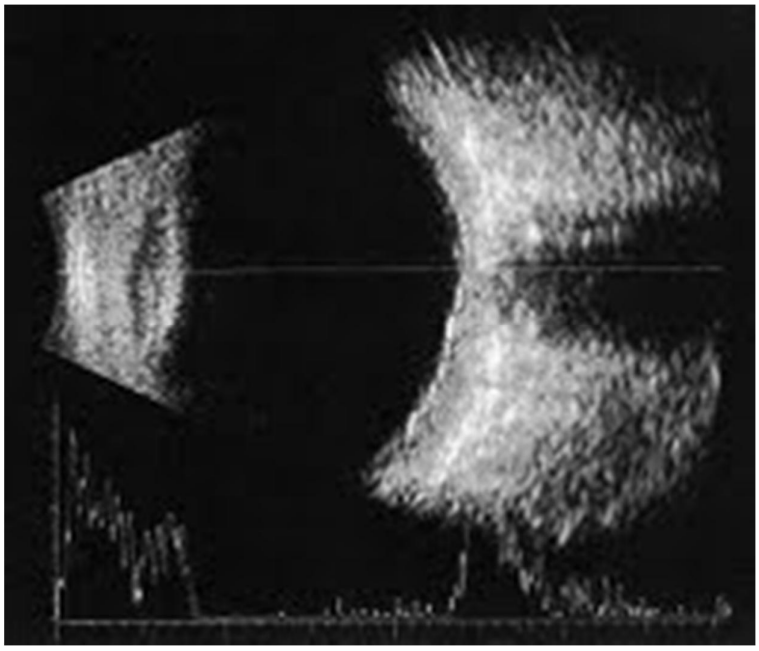
In this study most commonly 30.4% patients had IOP of 12 followed by 28.2% patients with IOP of 14 , 17.6% patients with IOP of 16 , 6.2 %patients with IOP of 4, 5.6% patients with IOP of 18, 2.6% patients with IOP of 6, 2.2% patients with IOP of 28, 1.8% patients with IOP of 26, 1.2% patients with IOP of 10, 1.2% patients with IOP of 30, 1% patients with IOP of 20, 1% patients with IOP of 22, 0.8% patients with IOP of 24, with least recorded IOP of 8 in 0.2% of patients.

FIGURE 7b: BAR CHART SHOWING DISTRIBUTION OF INTRAOULAR PRESSURE IN THE STUDY GROUP

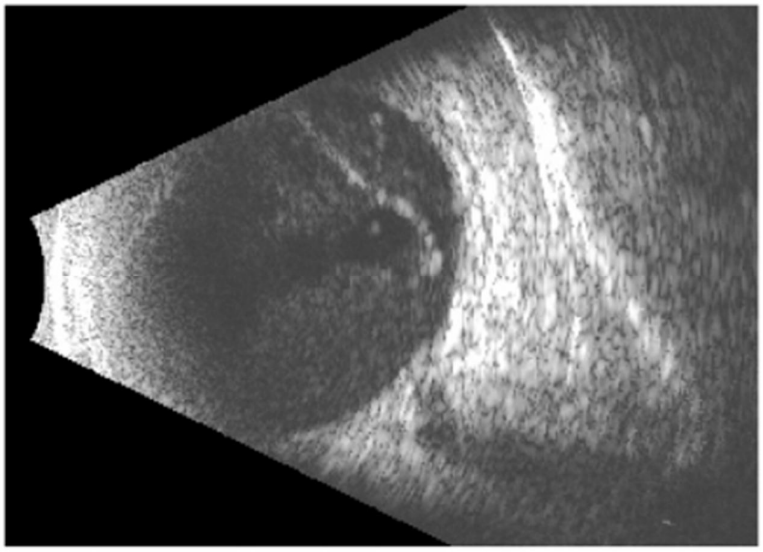


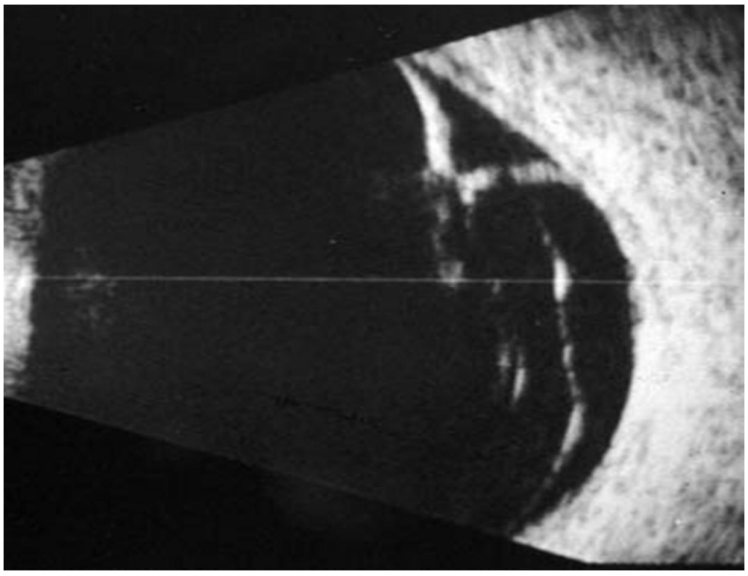
152 patients had IOP of 12 followed by 141 Patients with IOP of 14 followed by 88 Patients with IOP of 16 with least common IOP of 8 was recorded in 1 patient.

NORMAL B-SCAN

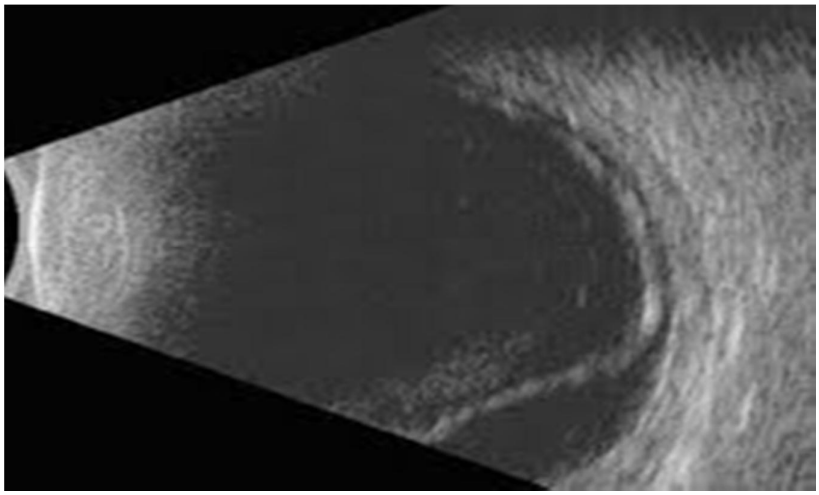


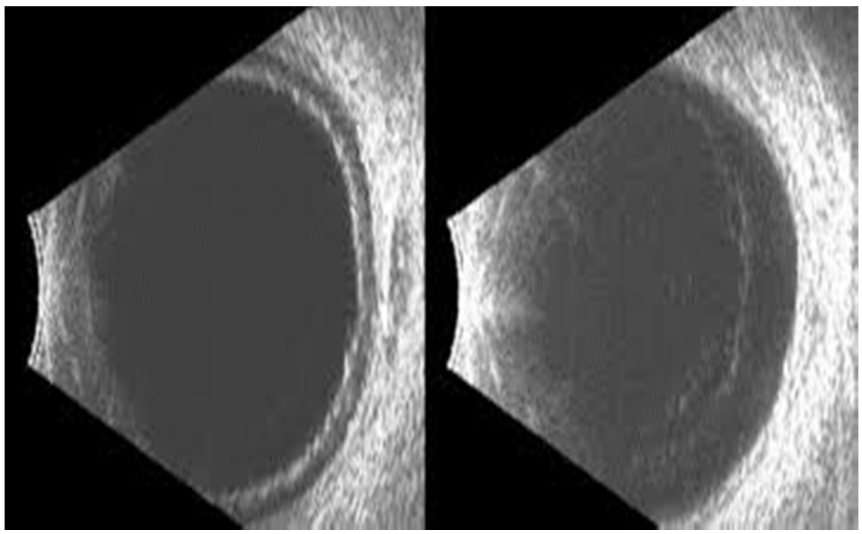
VITREOUS DEGENERATION



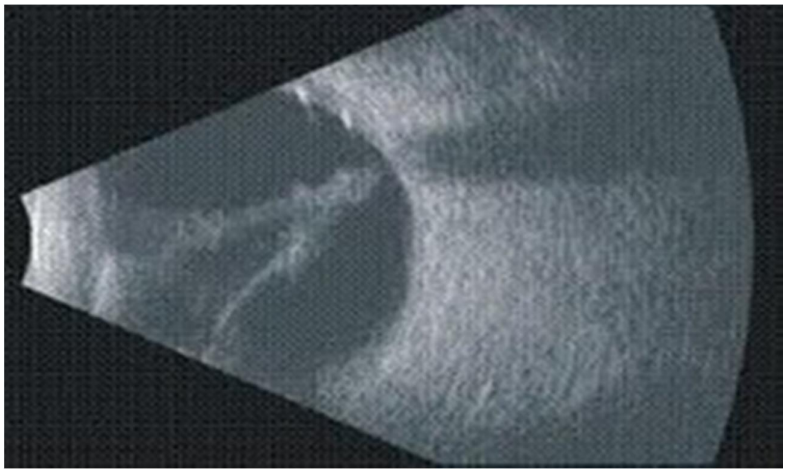


POSTERIOR VITREOUS DETACHMENT





TRACTIONAL RETINAL DETACHMENT



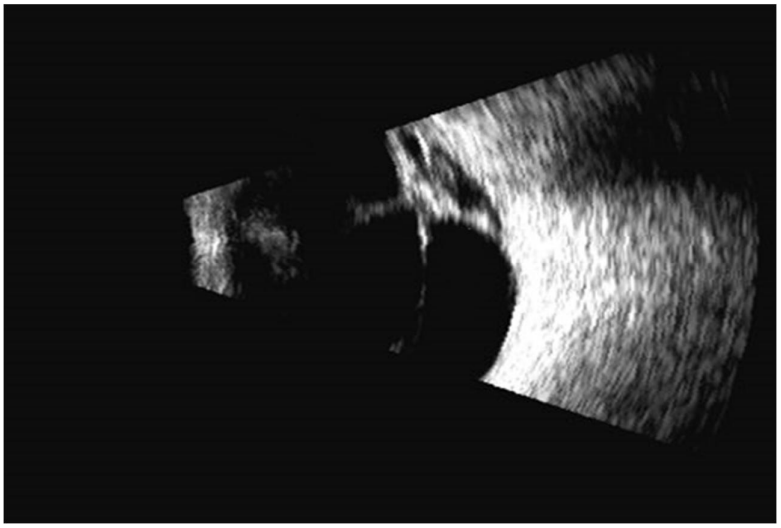
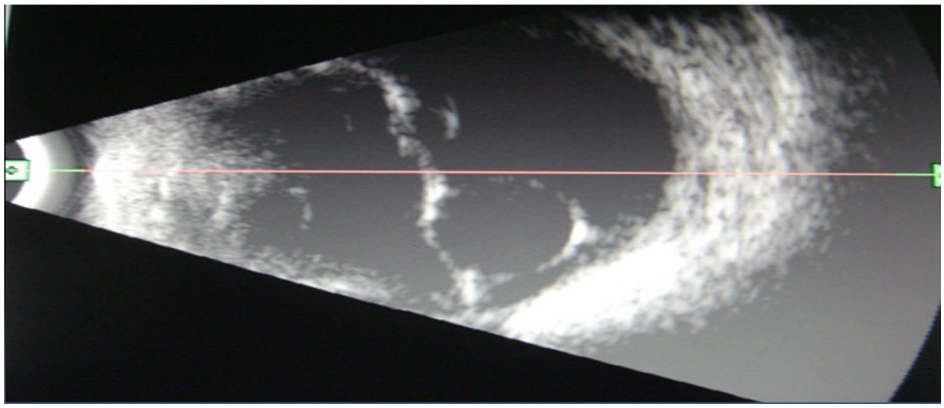


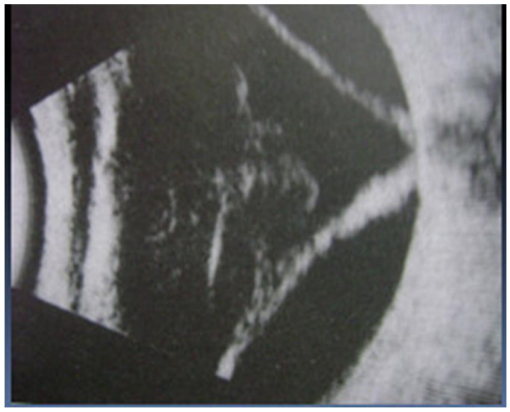
TABLE 8a: B-SCAN FINDINGS

FINDINGS	NO. OF CASES	%
Normal	285	57
Posterior vitreous detachment	68	13.6
PVD with vitreous degeneration	12	2.4
Asteroid hyalosis	17	3.4
Thickened posterior capsule	2	0.4
Retinal detachment	23	4.6
Posterior staphyloma	2	0.4
Vitreous hemorrhage	6	1.2
Vitreous degeneration	82	16.4
Optic nerve head Coloboma	1	0.2
Intra ocular foreign body	2	0.4

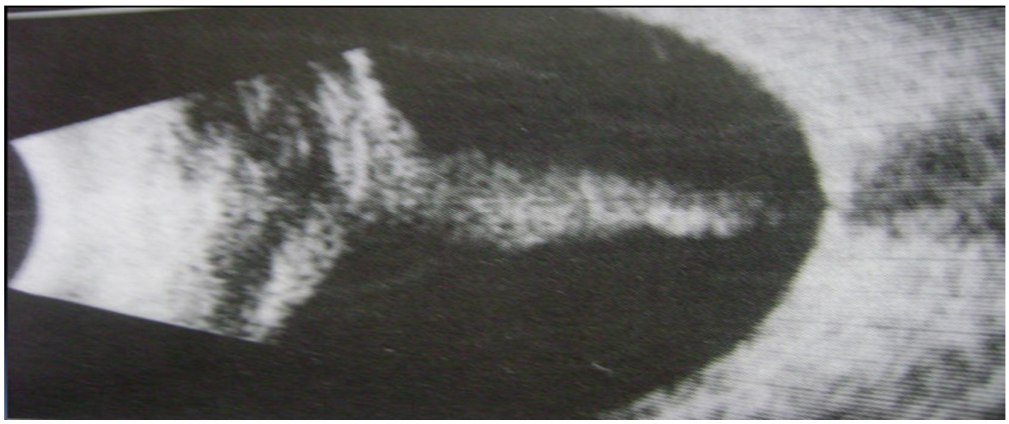
LONG STANDING RETINAL DETACHMENT



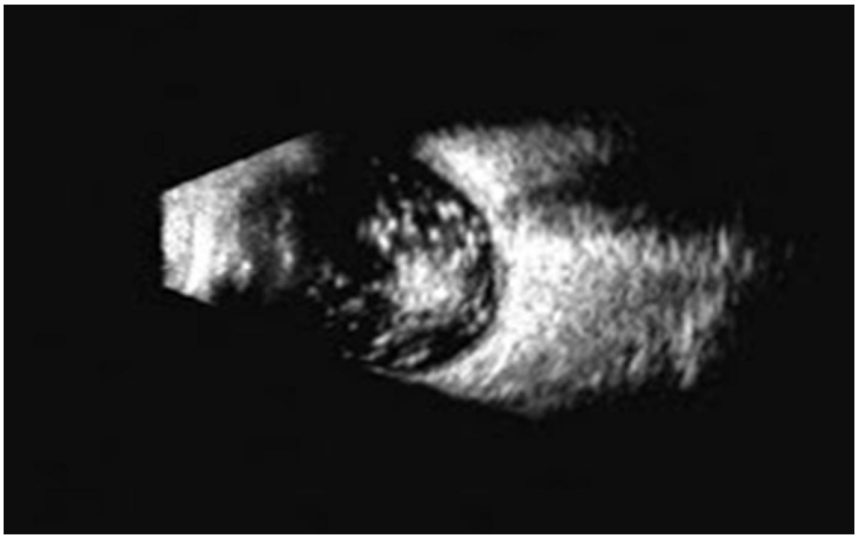
OPEN FUNNEL RD

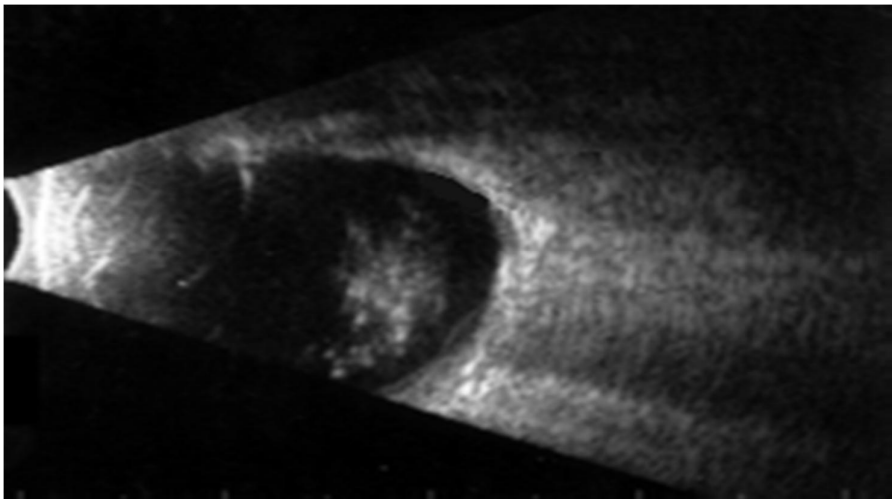


CLOSED FUNNEL RD

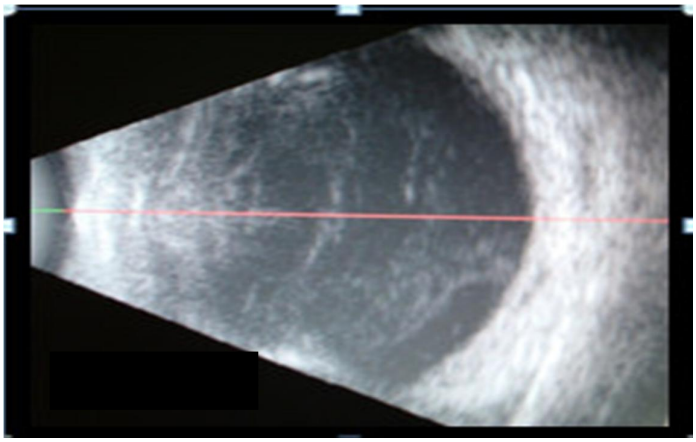


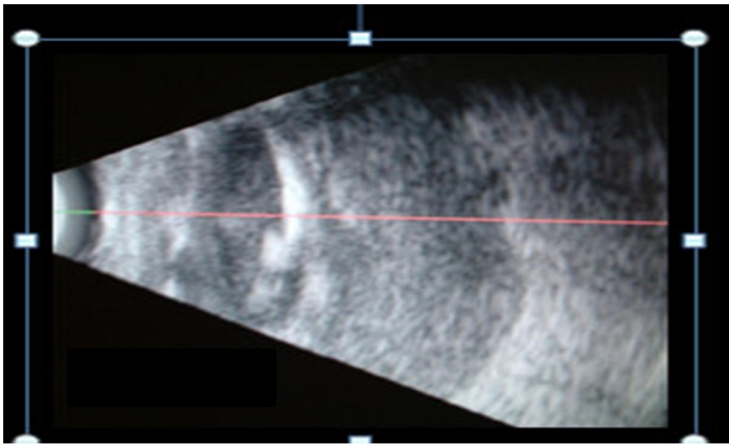
ASTEROID HYALOSIS





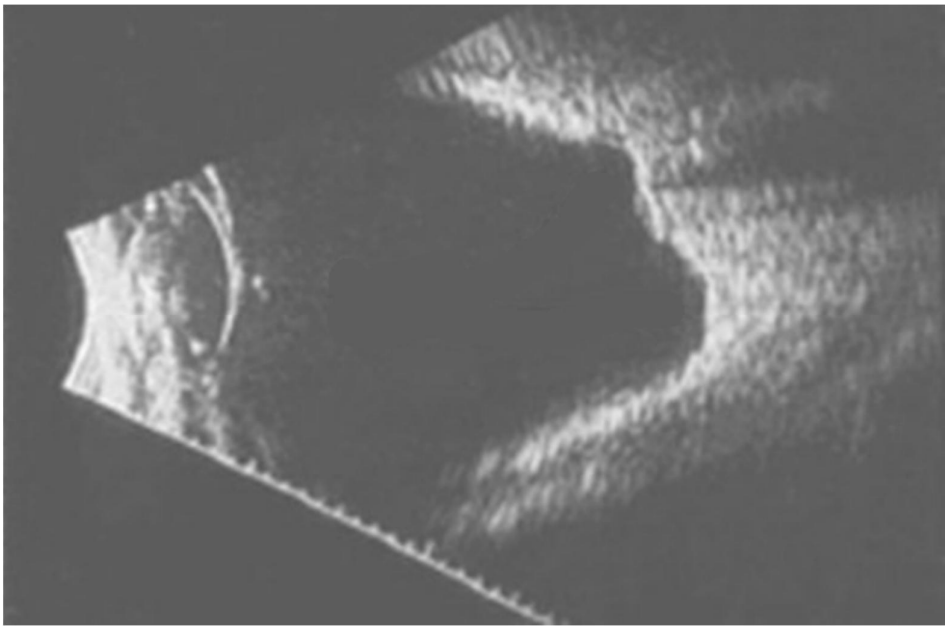
VITREOUS HAEMORRHAGE

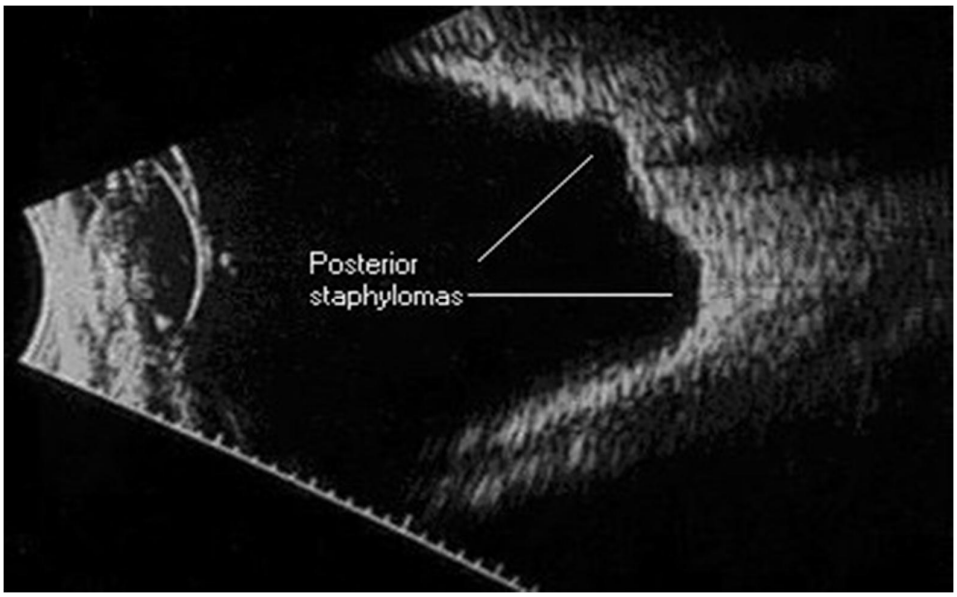




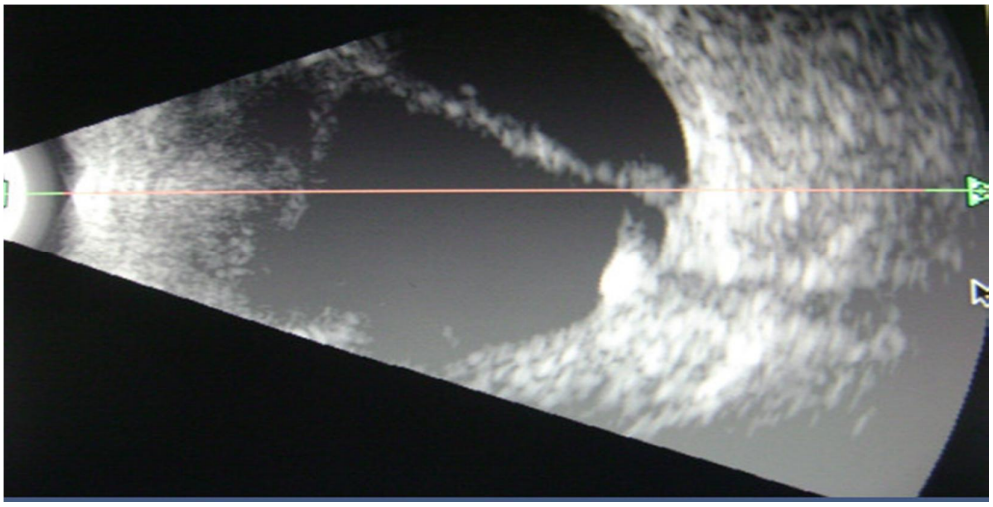
In this study 57% had normal B-scan findings followed by 16.4% of patients with vitreous degeneration ,13.6% of patients with Posterior vitreous detachment, 4.6% of patients with Retinal detachment, 3.4% of patients with asteroid hyalosis ,2.4%with PVD with Vitreous degeneration, 1.2% of Patients had vitreous hemorrhage, 0.4% patients with thickened posterior capsule,0.4%with posterior staphyloma and o.4% of Patients with Intraocular foreign body and 0.2% patients with ONH Coloboma being the least common finding.

POSTERIOR STAPHYLOMA





IOFB



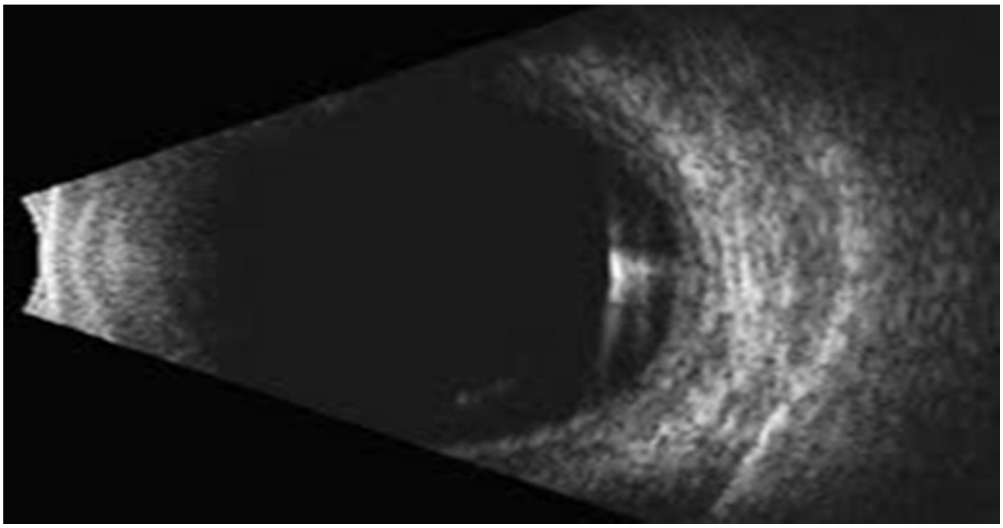
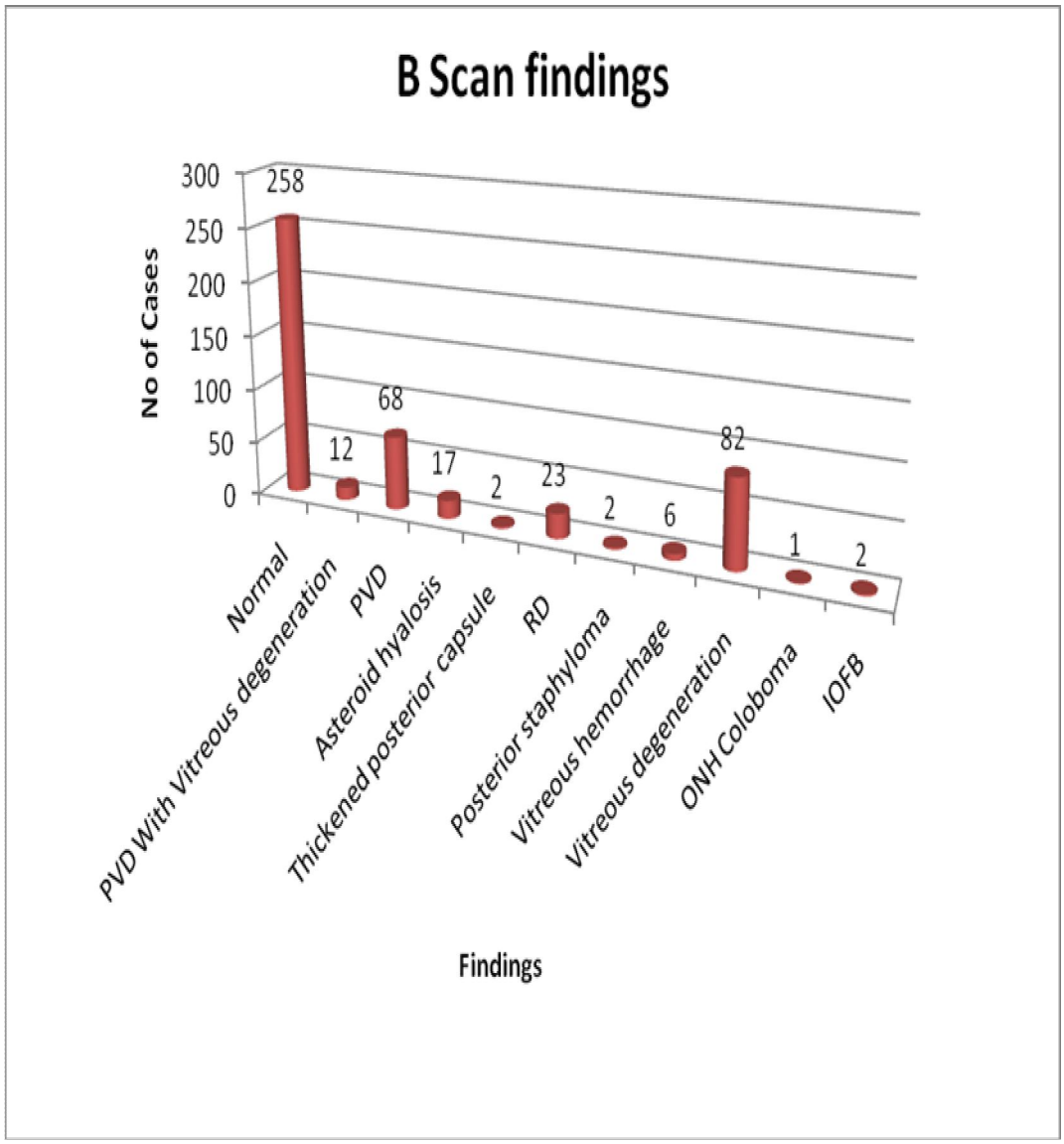
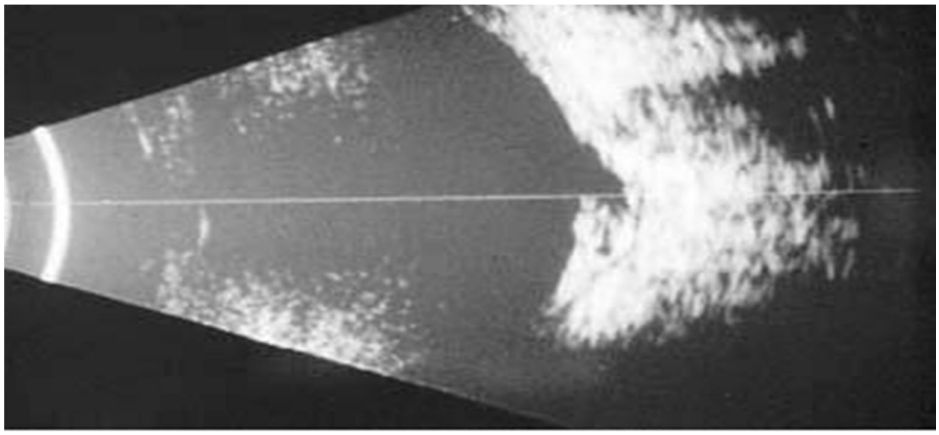


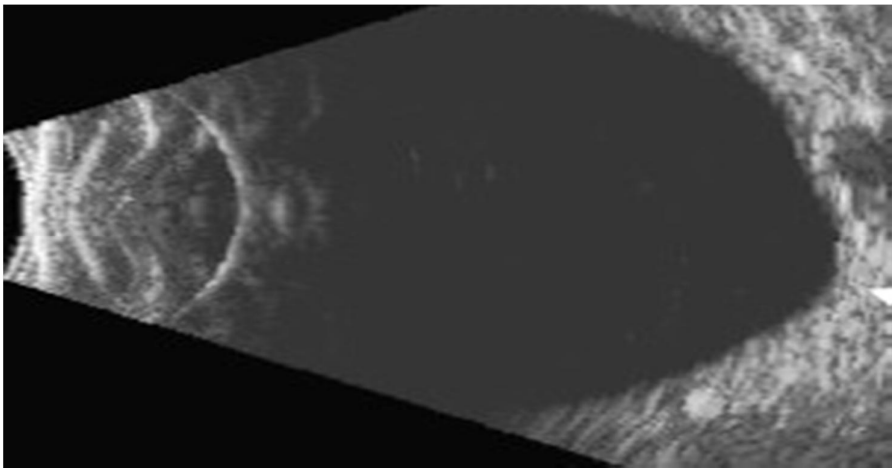
FIGURE 8b: BAR CHART SHOWI NG B-SCAN FINDINGS



OPTIC NERVE HEAD COLOBOMA



THICKENED POSTERIOR LENS CAPSULE



Of 500 patients studied 285 patients had normal B-scan findings followed by 82 patients with vitreous degeneration, 68 patients with Posterior Vitreous detachment, 23 patients with retinal detachment, 17 patients with asteroid hyalosis, 12 patients had Posterior Vitreous detachment with vitreous degeneration.6 patients had vitreous hemorrhage, 2 patients had thickened posterior capsule,2 patients had posterior staphyloma and 2 patients had IOFB and ONH Coloboma was noted in 1 patient.

COMPARATIVE STUDIES

STUDY I

The study done by Manzoor A Qureshi, Khalida Laghari showed that B-scan is one of the diagnostic tool for detecting concealed posterior segment lesions and it can be performed routinely in cataract patients posted for surgery, to help in surgical planning. Diagnostic B-scan ultrasound on 750 cataract patients was done in 71 Patients with Traumatic Cataract,679 Patients with Non traumatic cataract before surgery. This was a prospective diagnostic study conducted between January 2007 to July 2007. Out of 750 patients in the study, posterior segment lesions was detected in 90 patients..25 patients (3%)had RD,14(2%) had PVD,24(3%)had vitreous haemorrhage,12(2%)had asteroid Hyalosis,9(1.2%)had Posterior Staphyloma,6(1%)had IOFB.

STUDY II

12- month prospective study was conducted by Bello and Adeoti in 2006 in patients with clinically diagnosed dense cataracts in either or both eyes, in which the posterior segment cannot be evaluated properly during ophthalmoscopy, and therefore were sent for ocular ultrasonography. B-scan ultrasound was done on 116 eyes of 80 patients. 110 eyes (94.8%) had a normal posterior segment. Total retinal detachment was noted in 3 eyes (2.59%), partial retinal detachment was noted in 1 eye (0.87%), 2 (1.72%)eyes with total retinal detachment along with vitreous haemorrhage were noted in the same patient

STUDY III

A retrospective study of 509 cases was done in the department of ophthalmology to explain the role of preoperative ultrasonographic assessment for patients having dense cataract:by Blumenthal EZ.. All patients underwent ultrasound examination by B-Scan .19.6% of the patients had a posterior segment pathology. The most frequent abnormalities detected were retinal detachment (4.5%), posterior staphyloma (7.2%), and vitreous hemorrhage (2.5%). One patient had a choroidal malignant melanoma .The prevalence of posterior segmental abnormalities was slightly higher in patients with traumatic cataract compared with the nontraumatic cataract patients (29.6% versus 19.0%, respectively; P = .1). The prevalence of retinal detachment was found to be high in the traumatic cataract subgroup (14.8% compared with 3.9%), but this was not of statistical significance

DISCUSSION

The ability to evaluate the posterior segment of the eye precisely in patients with opaque media is very essential to good surgical care of the cataract patient. In patients with dense cataracts, the posterior segment is not accessible to direct and indirect ophthalmoscopy and so adequate assessment of the posterior segment to exclude abnormalities becomes a difficult task. There is also a risk of poor visual prognosis in patients with cataracts who may also have co-existing posterior segment abnormalities. In these Situations,B Scan Ultrasonography provides a method of assessing the structural changes in the posterior segment in these patients. In the 500 eyes we studied, we were able to demonstrate and confirm the size location, shape and area of lesions like retinal detachment, vitreous haemorrhage, Intraocular foreign body, vitreous degeneration, posterior vitreous detachment, asteroid hyalosis, thickened posterior lens capsule and posterior staphyloma.

In this study maximum patients 216(43.2%) were in 61-70 yrs age group followed by 30.4% in 51-60 yrs group followed by 12.8% in 71-80 yrs group and least number of 0.4%(2) were in 10-20yrs.

Our study included 274 females and 226 males. `

In our study we came across 302 cases of mature cataract, 136 cases of nuclear sclerosis, 21 cases of intumescent cataract, , 15 cases of hypermature cataract, 11 cases of complicated cataract, 10 cases of traumatic cataract and 5 cases of Congenital Cataract.

This was Comparable to the study done by Quereshi which Included 750 Patients of which 71(9.47%) patients had traumatic cataract and 679(90.53%) patients had other types of Cataract.

In our study most of the patients (158) had a vision of hand movements accounting to 31.6% of patients, followed by perception of light(PL+) was present in 154 patients(30.8%). The least common visual acuity, ½ /60 was observed in 15 patients(3%)

Relative afferent papillary defect (RAPD) was present in 4%(20) of the patients. Sluggishly reacting pupil was noted in 2%(10) of the patients. Synechiae in the pupillary region was noted in 2 patients with complicated cataract.most of the patients (468)accounting to about 93.6% had normal Pupillary Reaction.

Intra ocular pressure was monitored in 500 patients. Maximum number of patients (152) accounting to about 30.2% patients had IOP of 12mm of hg and 141 patients accounting to about 28.2% had an IOP of 14mm of hg. Least common IOP of 8mm of Hg was observed in 0.2% of patient

The guarded visual prognosis was explained prior to surgery to patients with retinal detachment, vitreous hemorrhage vitreous degeneration, asteroid hyalosis, IOFB, Posterior Staphyloma, Optic nerve head coloboma .

In our Study, vitreous degeneration was found in 82 patients(16.4%) followed by posterior vitreous detachment in 68 patients(13.6%), retinal detachment in 23 patients(4.6%), asteroid hyalosis in 17 patients(3.4%), vitreous hemorrhage in 6 patients(1.2%), posterior staphyloma in 2 patients(0.4%), thickened lens capsule in 2

patients(0.4%) and optic nerve head coloboma in 1 patient(0.2%). 285 patients were found to have Normal B-scan which accounted to about 57% of the study group.

In 23patients with retinal detachment included rhegmatagenous and tractional detachment. Long standing RD appeared as funnel shaped or T shaped highly reflective membranes with minimal after movements. This was helpful in pre operative assessment and planning the surgery and to explain the visual prognosis in these patients before surgery.

In the patients with posterior vitreous detachment a highly reflective membrane was noted with after movements. Follow up ultrasonic examinations to evaluate the changes such as absorption, further organization or extent of detachment was important in pre operative assessment.

Vitreous degeneration was found in 82 patients. In 9 patients who had long standing vitreous hemorrhage, the density and location of the hemorrhage was recorded and follow up ultrasonic examination was done to evaluate the changes such as absorption and organization. Intra

ocular foreign body was found in a patient who also had an associated vitreous hemorrhage and Retinal detachment.

The study done by Mansoor A Qureshi showed that retinal detachment was present in 25 patients(3%) in the study conducted Salman A, 3 patients (2.59%) had RD. In the study conducted by Blumenthal 4.5% patients had RD. These observations are comparable to our study which showed 23 patients with RD(4.5%).

In the study by Qureshi 14 patients (2%) had PVD .In our study there were 68 patients (13.6%) had PVD.

In our study 82 patients (16.4%) had vitreous degeneration.

In the study by Qureshi 24 patients(3%) had vitreous hemorrhage. In the study by Salman A 2 patients (1.7%) had vitreous hemorrhage. The Blumenthal EZ study showed vitreous hemorrhage in 2.5% of patients. This is comparable to our study which showed 6 patients(1.2%) with vitreous hemorrhage.

In Qureshi study posterior staphyloma was seen in 5 patients(0.6%) and 7.2% patients in the Blumenthal EZ study. Our study is showed posterior staphyloma in 2 patients(0.4%).

Asteroid hyalosis was present in 12 patients(2%) in Qureshi study , this is comparable to our study which showed 17 patients(3.4%).

Intra ocular foreign body was found in 6 patients(1%) in the Qureshi study .Our study showed intra ocular foreign body in 2 patients(0.4%).

In the Qureshi study 660 patients had a normal B scan, in the study by Salman A 110 patients(94.8%) had a normal B scan and in the Blumenthal EZ study 80.4% patients had normal B scan as compared to our study which showed 285 patients (57%) with normal B scan findings.

Other findings in our study were ONH Coloboma, thickened posterior capsule.

SUMMARY AND CONCLUSION

- The most common age distribution in the study group was 61-70 yrs (216). This accounted 43.2% of patients, least common age group was found to be 10-20 yrs with one patient. This accounted to about 0.4% of patients.

- Our study included 274 females and 226 males. This accounted to about 54.8% for females and 45.2% for males.

- 258 patients had dense lens changes in the right eye (51.6%), 203 patients had dense lens changes in the left eye (40.6%), 39 patients had bilateral dense lens changes(7.8%).

- 158 patients had vision of hand movements accounting to about 31.6% of patients and then 154 patients had perception of light accounting to about 30.8% of patients,104 patients had a vision of counting fingers close to face accounting for 20.8% of patients, 42 patients were found to have no perception of light accounting to about 8.4% of patients, 27 patients had a vision of 1/60 accounting for 5.6% of patients, 15 patients had a vision of ½ /60 accounting to about 3% of patients.

- Pupillary assessment was done and pupillary reaction was normal (reacting to both direct and consensual light) in 468 patients (93. 6%), Relative afferent pupillary defect was observed in 20 patients (4%), pupil was sluggishly reacting in 10 patients (2%), synechiae in the pupillary region was noted in 2 patients (0.4%).

- Of the 500 patients in our study 302 patients had mature cataract accounting to about 60.4% of patients followed by 136 patients with grade IV nuclear sclerosis accounting to about 27.2% of patients, 21 patients with intumescent lens accounting to about 4.2% of patients and 15 patients with hypermature cataract accounting to about 3% of patients. Complicated cataract was found in 11 patients (2.2%), traumatic cataract in 10 patients(2%) and least common being congenital cataract in 5 patients accounting to about 1% of patients.

- Intra ocular pressure was monitored. Maximum number of patients (152) accounting to about 30.2% patients had IOP of 12mm of Hg and 141 patients accounting to about 28.2% had an IOP of 14mm of Hg. Least common IOP of 8mm of Hg was observed in 0.2% of patients.

- The B scan was found to be normal in 285 patients accounting to about 57% of patients. The most common abnormality observed in B scan was vitreous degeneration in 82 patients accounting to about 16.4% of patients. Posterior vitreous detachment was found in 68 patients accounting to about 13.6% of patients. Retinal detachment was found in 23 patients accounting to 4.6%patients.Posterior vitreous detachment with vitreous degeneration was observed in 12 patients accounting to 2.4%of patients. Vitreous haemorrhage was found in 6 patients accounting to 1.2%of patients. Posterior staphyloma was observed in 2 patients (0.4%), Intra ocular foreign body in 2 patients (0.4%).Optic Nerve Head Coloboma was found in 1 patient (0.2%).

Hence I conclude that ultrasonography has helped us immensely in diagnosis and proper evaluation of patients and for planning a surgery .One can assess the ultimate visual prognosis in these patients. The purpose of the study was to evaluate the prevalence and nature of intraocular pathologies detected by preoperative ultrasound examination in patients having dense cataracts. This may influence the surgical strategy and also the postoperative visual prognosis.

ANNEXURES

BIBLIOGRAPHY

1. Mundt GH, Hughes WF. Ultrasonics in ocular diagnosis. Am J Ophthalmol. 1956

2. Baum G, Greenwood I. The application of ultrasonic locating technique to ophthalmology. Arch Ophthalmol. 1958

3. Till P, Osoining KC. Ten year study on clinical echography in intraocular disease. Bibl Ophthalmol.1975

4. Hodes BL. Eye disorders: Using ultrasound in ophthalmic diagnosis. J Postgrad Med. 1976

5. Zafar D, Sajad AM, Qadeer A. Role of B-Scan ultrasonography for posterior segment lesions. Pak J LUMHS. 2008

6. Khan AJ. Malignant melanoma. Pak J Ophthalmol. 1985

7. Bello TO, Adeoti CO. Ultrasonic assessment in pre-operative cataract patients. Niger Postgrad Med J.2006

8. Ahmed J, Shaikh FF, Rizwan A, Memon MF. Evaluation of vitro-retinal pathologies using B-scan ultrasound. Pak J Ophthalmol. 2009

9. Bhatia IM, Qanda A, Dayal Y. Role of ultrasonography in ocular Trauma. Indian J Ophthalmol.1983

10. Adebayo SB, Onabolu OO, Bodunde TO, Ajibode HA. Nigerian Med Pract.

11. Ali SI, Rehman H. Role of B-scan in preoperative detection of posterior segment pathologies in cataract patients. Pak J Ophthalmol. 1997

12. Nzeh DA, Owoeye JF, Ademola-Popoola DS, Uyanne I. Sonographic evaluation of ocular trauma in llorin, Nigeria. Eur J Ophthalmol. 2006

13. Dawood Z, Mirza SA, Qadeer A. Role of B-scan ultrasonography for posterior segment lesions. Pak J LUMHS. 2008

14. Butt NH, Hye A, et al. Management of fire cracker injuries. Pak J Ophthalmol. 2005

15. Javed EA, Chaudhry AA, Ahmed I, Hussain M. Diagnostic applications of B-scan. Pak J Ophthalmol. 2007

16. Salman A, Parmar P, Vanila CG, Thomas PA, Jesudasan CA. Is ultrasonography essential before surgery in eyes with advanced cataracts. J Postgrad Med. 2006

17. Anteby II, Blumenthal EZ, Zamir E, Waindim P. The role of preoperative ultrasonography for patients with dense cataract: a retrospective study of 509 cases. Ophthalmic Surg Lasers.1998

18. Haile M, Mengistu Z. B-scan ultrasonography in ophthalmic diseases. East Afr Med J.1996

19. Qureshi MA, Laghari K. Role of B-scan ultrasonography in pre-operative cataract patients. *Int J Health Sci (Qassim)*. Jan 2010

20. Byrne SF, Green RL. *Ultrasound of the Eye and Orbit*. 2nd ed. St. Louis, Mo: Mosby Year Book; 2002.

21. Mustafa M, Montgomery J, Atta H. A novel educational tool for teaching ocular ultrasound. *Clin Ophthalmol*. 2011.

22. Vodapalli H, Murthy SI, Jalali S, Ali MJ, Rani PK. Comparison of immersion ultrasonography, ultrasound biomicroscopy and anterior segment optical coherence tomography in the evaluation of traumatic phacoceles. *Indian J Ophthalmol*. Jan-Feb 2012

23. Coleman DJ, Silverman RH, Lizzi FL, Rondeau MJ. *Ultrasonography of the Eye and Orbit*. 2nd ed. Lippincott Williams & Wilkins; 2006.

24. Byrne SF, Green RL. *Ultrasound of the Eye and Orbit*. St. Louis, Mo: Mosby Year Book; 1992.

25. DiBernardo C, Schachat AP, Fekrat S. *Ophthalmic Ultrasound: A Diagnostic Atlas*. New York: Thiemes Medical Publishers, Inc; 1998.

26. Harrie RP. *Clinical Ophthalmic Echography: A Case Study Approach*. New York, NY: Springer Science+Business Media, LLC; 2008.

27. Kendall CJ. *Ophthalmic Echography*. Thorofare, NJ: Slack Incorporated; 1990

28. Darnley-Fisch DA, Byrne SF, Hughes JR, Parrish RK, Feuer WJ. Contact B Scan echography in assessment of optic nerve cupping. Am J Ophthalmol 1990

29. Coleman DJ. Reliability of ocular and orbital diagnosis with B-scan ultrasound.. Ocular diagnosis. *Am J Ophthalmol.* 1972 Apr;

30. Forrester J, Williamson J. Resolution of intravitreal clots by urokinase. *Lancet.* 1973

31. OKSALA A. The echogram in vitreous opacities. *Am J Ophthalmol.* 1960 Jun

PROFORMA

Serial no	:		
Name	:		
Age	:		
Sex	:		
Op no	:		
Occupation	:		
Address	:		
Ocular complaints	:		
Past history	:		
Medical history	:		
Ocular examination	:	Right eye	Left eye
Vision	:		
Eyelids	:		
Eyelashes	:		
Extra ocular movements	:		
Slit lamp examination	:		

Conjunctiva :

Cornea :

Anterior chamber :

Iris :

Pupil :

Lens :

Fundus :

IOP :

B SCAN ULTRASONOGRAM

Scan	Lens capsule	Vitreous	Retina &choroid	Optic nerve	Macula	sclera
Horizontal transverse						
Vertical transverse						
Horizontal transverse						
Vertical transverse						
Vertical axial						
Horizontal axial						

ABBREVIATIONS

B scan – Brightness scan

A scan – Amplitude scan

M- male

F-female

RE- Right eye

LE- Left eye

HM- Hand movements

CFCF – counting fingers close to face

PL – Perception of light

N – normal

SL – sluggishly reacting to light

NS IV – nuclear sclerosis grade IV

MC – mature cataract

HMC – Hypermature cataract

Int. lens – Intumescent lens

Trau cat – Traumatic cataract

Complic cat – Complicated cataract

Cong. Cat – Congenital cataract

IOP – Intraocular pressure

PVD – Posterior vitreous detachment

RD – Retinal detachment

AST HYAL – Asteroid hyalosis

Vit deg – Vitreous degeneration

Vit he – Vitreous hemorrhage

Post Staph – Posterior stapyloma

ONH – Optic nerve head

MASTER CHART

Sl.No.	Name	Age /Sex	I.P.No.	Vision	Pupillary assessment	Lens Changes	IOP	B.Scan Finding
1	Lakshmi	58/F	20619	HM +	N	RE NS IV,LE PSC	12	N
2	Amala	68/F	27111	HM +	N	RE NS IV,LE PSC	12	N
3	Devu	67/F	27189	CFCF	N	RE NS IV,LE PSC	14	N
4	Malika	72/F	25186	HM +	N	RE NS IV,LE PSC	14	N
5	Mahendran	70/M	26649	CFCF	N	RE NS IV,LE PSC	16	N
6	Mary	68/F	26544	PL+	N	RE NS IV,LE PCC	16	N
7	Kanniappan	63/M	20774	1 / 60	N	LE MC,RE PSEU	12	N
8	Rosy	60/F	20480	HM +	N	LE MC,RE PCC	12	AST HYAL
9	Kauppaya	60/F	20482	CFCF	N	RE NS IV LE N	12	N
10	Kuppu	45/f	22588	HM +	N	RE MC LE PCC	14	N
11	Poobathiammal	63/F	22613	HM +	N	BE NS IV	14	PVD
12	Sarala	67/F	22614	HM +	N	LE MC,RE PSEU	16	N
13	Ismail	72/M	22917	1/2 / 60	N	LE MC,RE PSC	14	VIT DEG
14	Dishabevi	70/F	22601	NO PL	N	LE-MC,RE-PCC	4	N
15	Kanagawalli	73/F	22596	PL+	N	RE NS IV,LE PSC	14	N
16	Mary	60/F	22620	PL+	N	Int. lens	28	N
17	Rukmani	65/F	24136	PL+	N	RE NS IV,LE PSC	10	PVD C VIT DEG
18	Parvathy	60/F	24140	CFCF	N	LE MC,RE PSEU	12	N
19	Natarajan	75/M	24172	NO PL	N	RE HMC,LE PSC	30	N
20	sar	64/M	24135	CFCF	N	LE MC,RE PCC	12	N
21	Maiammal	61/F	24175	PL+	N	LE MC,RE PSC	18	PVD
22	Vaidegi	61/F	25064	HM +	N	LE MC,RE PSC	18	N
23	Chinnammal	70/F	25049	HM +	N	LE MC,RE PSEU	14	VIT DEG
24	Prema	85/F	25063	CFCF	N	RE NS IV,RE PSC	16	VIT DEG
25	Vaidhyanadhan	71/M	25055	CFCF	N	RE MC LE PCC	14	N
26	Irdrani	60/F	25321	HM +	N	BE NS IV	12	VIT DEG
27	Kokila	71/F	25097	HM +	N	LE MC,RE PSC	12	N
28	Jeyaram	69/M	26349	CFCF	N	LE MC,RE PCC	12	N
29	Rani	62/F	26402	HM +	N	LE MC,RE PSC	12	PVD
30	Murugan	62/M	25612	HM +	N	LE MC,RE PSC	14	N
31	Kuppusamy	60/F	25612	NO PL	N	RE MC,LE PSC	6	PVD
32	Vasanthy	20/F	25613	PL+	3mm SL	LE- complic cat, RE-N	14	N
33	Lakshmi	69/F	27060	PL+	N	LE-MC ,RE-PCC	14	VIT DEG
34	Kavitha	67/F	25545	PL+	N	LE MC,RE PCC	12	VIT DEG
35	Mujiba	60/F	28471	CFCF	N	LE MC,RE PSC	12	N
36	Moorjanisha	60/F	27030	1/2 / 60	N	RE MC,LE PSEU	12	N
37	Amudha	60/F	29050	1 / 60	N	RE MC LE PCC	16	N
38	Murugesan	74/M	29013	PL+	N	LE Int.lens,RE PSC	30	AST HYAL
39	Saroja	68/F	30260	HM +	N	LE MC,RE PCC	16	N
40	Sulaiman	78/M	30231	PL+	N	LE HMC,RE N	28	VIT DEG
41	Rani	75/F	30262	HM +	N	RE NS IV,LE PSEU	18	VIT DEG
42	Kani	68/M	30256	HM +	N	LE MC,RE N	18	N
43	Pushparaj	40/M	30609	CFCF	N	LE-MC ,RE-PCC	16	VIT DEG
44	Rajendran	66/M	30276	HM +	N	LE MC,RE PSC	12	N
45	Sugumar	60/F	16772	HM +	N	RE NS IV,LE PCC	14	N
46	Palaniammal	61/F	31246	PL+	N	RE MC,LE PSEU	14	N
47	Padma	78/F	32202	PL+	N	LE MC,RE PSC	12	N
48	Venkatachalam	11/M	16712	PL+	N	RE Cong CAT,LE N	12	N
49	Jeyanthi	8/F	31280	PL+	N	RE Cong CAT,,LE N	14	N
50	Susila	55/F	28174	1/2 / 60	N	RE MC,LE PCC	16	N
51	Ezhumalai	60/M	28189	CFCF	N	RE MC,LE PSC	16	N
52	Meenambal	65/F	27858	HM +	N	RE MC,LE PCC	14	N
53	Sadhasivam	75/M	27863	HM +	N	LE HMC,RE N	28	N
54	Bagyalakshmi	32/F	28418	CFCF	3mm SL,synaechiae	LE- complic cat,RE N	12	N
55	Murugesan	58/M	28674	PL+	N	RE MC,LE PSEU	12	AST HYAL
56	Subramani	58/M	27625	PL+	N	RE MC,LE PCC	14	N
57	Kamatchi	65/F	27345	PL+	N	RE NSIV,LE PSC	30	VIT DEG

58	Annamal	75/F	28194	NO PL	N	LE-MC ,RE-PCC	4	N
59	Magalakshmi	75/F	28173	HM +	N	LE-MC ,RE-PCC	12	PVD
60	Malika	70/F	28940	HM +	N	RE MC,LE PSC	12	PVD
61	Kamala	60/F	28659	CFCF	N	RE MC,LE PSEU	16	PVD C VIT DEG
62	Muniyammal	72/F	27850	HM +	N	RE NS IV,LE PCC	16	VIT DEG
63	Sadhasivam	75/M	27863	PL+	N	BE NS IV	14	VIT DEG
64	Devika	67/F	28401	PL+	N	RE MC,LE PSC	12	VIT DEG
65	Bagyalakshmi	62/F	28418	PL+	N	RE MC,LE PCC	12	VIT DEG
66	Susila	65/F	28174	PL+	N	LE MC,RE PSEU	14	N
67	Ezhumalai	60/M	28189	HM +	N	RE MC,LE PCC	14	N
68	Michadraj	51/M	25931	HM +	N	RE MC,LE PSC	12	N
69	Sulochana	60/F	25493	HM +	N	RE MC LE PCC	14	N
70	Jayaram	50/M	26354	CFCF	N	RE MC,LE PSEU	14	N
71	Derados	53/M	257164	HM +	N	RE MC,LE PCC	12	N
72	Manikandan	67/M	43562	HM +	N	RE NS IV,LE PSC	12	N
73	Jeganathan	64/M	27002	PL+	N	BE NS IV	14	PVD
74	Manikandan	72/M	27349	PL+	N	Int. lens	28	N
75	Chandra	55/M	27379	PL+	N	RE MC,LE PCC	14	PVD
76	Mani	72/M	27349	PL+	N	RE NSIV,LE PCC	16	VIT DEG
77	Baskar	64/M	75606	PL+	N	BE-NS IV	30	N
78	Subramani	58/M	27625	HM +	N	LE NS IV,RE PSC	14	VIT DEG
79	Muniyammal	72/M	27850	CFCF	N	RE NS IV,LE PCC	18	N
80	Sundar	50/M	27312	HM +	N	LE MC,RE PSC	14	AST HYAL
81	Kamala	48/F	22956	CFCF	N	LE MC,RE PSEU	12	N
82	Arumugam	11/M	27885	HM +	N	RE Cong CAT,LE N	12	N
83	Kamatchi	65/F	27345	CFCF	N	LE-MC ,RE-PCC	14	VIT DEG
84	Arumugam	77/M	27885	HM +	N	LE MC,RE PSEU	12	VIT DEG
85	Annamal	75/M	28194	HM +	N	RE NS IV,LE PCC	12	VIT DEG
86	Magalakshmi	75/F	28173	PL+	N	LE MC,RE PSC	14	VIT DEG
87	Narroor	48/M	28394	PL+	N	RE MC,LE N	16	N
88	Suguna	60/F	16772	1 / 60	N	LE MC,LE PCC	14	VIT DEG
89	Durka	79/F	31544	1/2 / 60	N	LE-MC ,RE-PCC	14	N
90	Kamatchi	65/F	30559	HM +	N	RE NSIV,LE PSC	12	VIT DEG
91	Padma	58/F	32202	HM +	N	LE MC,RE PSEU	12	AST HYAL
92	Venkatachalam	66/M	16712	CFCF	N	RE MC,LE PCC	14	VIT DEG
93	Kalyani	55/F	33966	CFCF	N	LE MC,RE PSC	16	N
94	Kalaiappan	68/M	33901	PL+	N	RE Int. lens,LE PCC	24	PVD
95	Rani	84/F	34276	CFCF	N	RE MC,LE PSEU	12	N
96	Palayam	80/M	34802	HM +	N	RE NS IV,LE PSC	14	VIT DEG
97	Gurumoorthy	65/M	35855	HM +	N	RE NS IV,LE PSC	14	PVD
98	Kuppammal	65/M	35707	HM +	N	RE NS IV,LE PCC	12	VIT DEG
99	Mariya Louis	66/M	36084	PL+	N	RE NSIV,LE PSEU	26	N
100	Dharmalingam	49/M	36053	PL+	N	LE- complic cat,RE N	16	N
101	Chinnaraj	66/M	36066	NO PL	N	LE MC,RE PSC	4	N
102	Dhanalakshmi	65/F	36056	PL+	N	RE NS IV,LE PSC	14	N
103	Govindharaj	65/M	35478	PL+	N	LE MC,RE PSC	14	N
104	Mariyammal	65/F	34813	PL+	N	RE MC,LE PCC	12	N
105	Muruga	68/M	37053	HM +	N	RE MC,LE PSC	12	N
106	Manoharan	25/M	37322	CFCF	N	RE- complic cat,LE N	14	N
107	Naramma	60/F	37238	1 / 60	N	RE MC,LE PSEU	16	N
108	Kokila	61/M	25997	CFCF	N	RE MC,LE PCC	12	N
109	Valli	73/M	37234	PL+	N	LE NS IV,RE PSEU	12	N
110	Ganesan	66/M	37997	PL+	N	LE MC,RE PSC	12	VIT DEG
111	Murugan	72/M	38899	PL+	N	RE NS IV,LE PSEU	12	N
112	Ramadoss	55/M	38774	HM +	3mm SL	RE-Normal,LE-Trau Cat	14	N
113	Rajeshwari	75/M	38592	HM +	N	RE MC,LE PCC	14	VIT DEG
114	Sekar	60/M	39526	CFCF	N	LE-MC ,RE-PCC	4	N
115	Govindharaj	60/M	39546	HM +	N	RE MC,LE PSC	16	PVD C VIT DEG
116	Subramani	55/M	39597	HM +	N	RE NS IV,LE PSC	16	PVD
117	Ellammal	76/F	39596	1/2 / 60	N	RE NS IV,LE PCC	12	VIT DEG
118	Kajabee	68/F	40448	1/2 / 60	N	RE MC,LE PSC	14	N

119	Anjalli	48/F	40498	1 / 60	N	RE Trau Cat, LE Normal	16	N
120	Palaiyan	80/M	34098	PL+	N	RE Int. lens,LE PCC	26	PVD
121	Soundari	66/F	40790	1 / 60	N	RE NS IV,LE PCC	12	VIT DEG
122	Banu	64/F	40812	1/2 / 60	N	LE MC,RE PSC	12	N
123	Perumal	65/M	40817	PL+	N	RE MC,LE PSEU	14	N
124	Susila	69/F	41451	PL+	N	RE MC,LE PCC	14	N
125	Babu	51/M	41787	PL+	N	RE MC,LE PSC	16	N
126	Dilli	55/M	41787	HM +	3mm SL	RE-Normal,LE-Trau Cat	12	N
127	Madasamy	47/M	40755	HM +	N	RE Trau Cat, LE Normal	14	N
128	Vasugi	65/F	31830	CFCF	N	RE NS IV,LE PSC	12	PVD
129	Chuan	54/M	32288	HM +	N	LE MC,RE PSEU	12	N
130	Rathi	65/F	32233	CFCF	N	RE NS IV,LE PSC	14	N
131	Rajendran	32/M	32222	1/2 / 60	3mm SL,synaechiae	RE- complic cat,LE N	4	N
132	Vasugi	65/F	304619	1 / 60	N	RE MC,LE PCC	12	PVD C VIT DEG
133	Muthulakshmi	65/F	32241	HM +	N	RE NS IV,LE PSC	12	N
134	Govindhammal	35/F	32252	HM +	N	RE- complic cat,LE N	16	N
135	Desam	63/F	32250	CFCF	N	RE MC,LE PSEU	14	N
136	Ramachandran	76/M	32257	HM +	N	LE Int. lens,RE PSC	26	PVD
137	Azhagesan	65/M	32482	CFCF	N	RE MC,LE PSC	14	VIT DEG
138	Noorjahan	60/F	32269	PL+	N	LE MC,RE PSC	14	AST HYAL
139	Muthulakshmi	45/F	32241	PL+	N	LE- complic cat,RE N	12	N
140	Govindhammal	75/F	32252	PL+	N	LE MC,RE PSC	12	N
141	Kuppammal	61/F	32744	CFCF	N	RE HMC,LE PSC	24	VIT DEG
142	Pandian	76/M	32741	HM +	N	LE MC,RE PSC	10	N
143	Gopal	69/M	33155	1 / 60	N	RE MC,LE PCC	12	VIT DEG
144	Kuppammal	71/F	32744	1 / 60	N	LE-MC ,RE-PCC	12	VIT DEG
145	Murugan	60/M	33476	PL+	N	RE MC,LE PSC	18	N
146	Gopal	78/M	33419	PL+	N	RE MC,LE PSEU	16	N
147	Pandian	66/M	32741	CFCF	N	BE NS IV	16	N
148	Punniakodi	60/M	29000	HM +	N	RE MC,LE PSC	12	N
149	Elumalai	60/M	28189	HM +	N	RE MC,LE PCC	12	N
150	Punniakodi	60/M	29291	CFCF	N	RE NS IV,LE PCC	12	N
151	Varathlama	78/M	266497	CFCF	N	RE NS IV,LE PSC	16	N
152	Valliammal	68/M	28473	NO PL	RAPD	RE MC,LE PSC	4	N
153	Valliammal	70/F	282396	1 / 60	N	BE NS IV	16	PVD
154	Jeevanandham	52/M	29742	1/2 / 60	N	RE MC,LE N	16	N
155	Chinnammal	40/F	278892	1 / 60	N	BE NS IV	18	PVD
156	Mohana	75/F	30053	PL+	N	RE MC,LE PSEU	16	N
157	Sundarambal	56/F	30021	PL+	N	RE NS IV,LE N	14	N
158	Anjalai	70/F	30067	PL+	N	LE MC,RE PSEU	12	AST HYAL
159	Shanthi	46/F	30625	HM +	N	RE MC,LE N	14	N
160	Bubiannammal	66/F	30637	CFCF	N	BE NS IV	16	PVD
161	Gopal	55/M	30764	HM +	N	RE MC,LE PCC	18	N
162	Valliammal	68/F	2843	CFCF	N	LE Int.lens,RE PSC	28	N
163	Mohana	75/M	30053	CFCF	N	BE-NS IV	26	N
164	Katoyappan	70/M	30990	CFCF	N	RE MC,LE PSEU	14	N
165	Anjalai	60/F	31095	PL+	N	RE MC,LE PSC	12	N
166	Sundarambal	56/F	31575	PL+	N	RE MC,LE PSC	12	N
167	Pattammal	68/F	31003	PL+	N	RE MC,LE PCC	12	N
168	Ramasamy	68/M	9113	1/2 / 60	N	RE NS IV,LE PCC	16	VIT DEG
169	Muniyammal	48/M	4131	1/2 / 60	N	RE MC,LE N	16	N
170	Lakshmi	60/F	7966	1 / 60	N	RE MC,LE PSC	16	N
171	Vijaya	62/F	9667	CFCF	N	RE NS IV,LE PSC	12	N
172	Krishnan	70/M	9047	HM +	N	LE NS IV,RE PCC	12	VIT DEG
173	Sivashakthi	62/M	9363	HM +	N	LE Int.lens,RE PSC	24	N
174	Lakshmi	74/F	9289	CFCF	N	BE NS IV	14	PVD
175	Anandhi	65/F	9286	HM +	N	BE MC	14	N
176	Ehambaram	70/M	8871	NO PL	N	LE-MC ,RE-PCC	4	N
177	Annamal	65/F	9286	HM +	N	BE MC	14	N
178	Gakammal	65/F	9120	PL+	N	RE MC,LE PSC	12	PVD C VIT DEG
179	Chandra	65/F	9049	PL+	N	LE NS IV,RE PSC	12	VIT DEG
180	Fathima	70/F	9578	PL+	N	LE NS IV,RE PSEU	14	VIT DEG

181	Jeya	63/F	15312	CFCF	N	BE MC	16	N
182	Mahalakshmi	60/F	9031	CFCF	N	RE NS IV,LE PCC	12	N
183	Kamalammal	68/F	9038	HM +	N	RE HMC,LE PSEU	28	N
184	Loganathan	63/F	10063	1 / 60	N	BE MC	12	N
185	Babu	63/M	9732	HM +	N	BE MC	14	N
186	Vallamma	60/F	9716	HM +	N	LE MC,RE PSEU	14	AST HYAL
187	Kala	65/F	10238	HM +	N	BE NS IV	16	N
188	Balayan	63/M	7433	CFCF	N	BE MC	12	N
189	Soori	57/M	6675	HM +	N	BE MC	12	N
190	Rayammal	49/F	7614	CFCF	N	BE NS IV	12	PVD
191	Muniyammal	60/F	5887	HM +	N	LE NS IV,RE PCC	14	N
192	Thangam	65/F	7620	HM +	N	BE NS IV	14	PVD
193	Palani	48/M	7896	HM +	N	BE MC	14	N
194	Rani	60/F	7297	PL+	N	LE NS IV,RE PSC	16	VIT DEG
195	Delli	52/M	7806	PL+	N	BE MC	16	N
196	Kuppuraj	65/M	8270	NO PL	RAPD	RE MC,LE PSC	6	RD
197	Saraswathi	80/F	3312	PL+	N	LE MC,RE PSC	18	PVD C VIT DEG
198	Jothimani	65/M	8918	CFCF	N	RE NS IV,LE PSEU	18	VIT DEG
199	Kaliammal	65/F	7532	CFCF	N	LE NS IV,RE PSC	12	N
200	Rani	65/F	8666	HM +	N	LE Int.lens,RE PCC	26	N
201	Thangam	65/F	7620	HM +	N	RE MC,LE PSC	12	VIT DEG
202	Mehanisha	69/F	8546	HM +	N	RE MC,LE PSC	12	N
203	Muniyammal	77/F	8552	1 / 60	N	RE MC,LE PCC	16	PVD
204	Thulasiammal	80/F	88610	1/2 / 60	N	RE MC,LE N	18	PVD
205	Kaspar	56/M	88182	1/2 / 60	N	RE MC,LE PCC	16	N
206	Kowsalya	61/M	85913	HM +	N	RE MC,LE PSC	18	VIT DEG
207	Manikandan	62/M	8592	PL+	N	LE NS IV,RE PSC	16	N
208	Jeya	68/F	9861	CFCF	N	LE MC,RE PCC	14	N
209	Malliga	50/F	10208	PL+	N	LE MC,RE PSC	14	N
210	Muniyammal	65/F	10206	PL+	N	LE MC,RE PSC	12	N
211	Elumalai	70/M	9580	PL+	N	LE MC,RE PCC	12	VIT DEG
212	Muniyammal	67/F	10363	HM +	N	LE NS IV,RE PSC	12	N
213	Selvaraj	67/F	10277	1 / 60	N	LE NS IV,RE PCC	14	VIT DEG
214	Kala	65/F	10238	CFCF	N	BE MC	14	N
215	Krishnamoorthy	52/M	10358	NO PL	RAPD	RE MC,LE PSEU	6	RD
216	Rajan	70/M	10254	CFCF	N	LE NS IV,RE PSC	14	N
217	Rajeshwari	60/F	10930	PL+	N	RE Int. lens,LE PSC	26	VIT DEG
218	Mahalakshmi	67/F	9750	CFCF	N	BE MC	12	N
219	Saroja	60/F	10350	HM +	N	RE NSIV,LE PCC	12	VIT DEG
220	Yamuna	67/F	10237	HM +	N	LE NS IV,RE PCC	16	N
221	Abdul	60/M	11058	HM +	N	LE NS IV,RE PSC	16	N
222	Kanniammal	50/F	11370	PL+	N	BE MC	18	N
223	Selvaraj	67/M	10277	CFCF	N	RE NSIV,LE PCC	18	VIT DEG
224	Saroja	60/F	15623	1 / 60	N	LE NS IV,RE PSC	12	N
225	Chandrasekar	65/M	15836	PL+	N	LE NS IV,RE PSC	12	N
226	Boopathy	58/M	10988	PL+	N	RE MC,LE PCC	14	N
227	Sundaraj	55/M	11278	PL+	N	RE MC,LE PCC	14	N
228	Suseela	60/F	15312	1 / 60	N	RE MC,LE PSC	14	N
229	Anjalai	65/F	16036	CFCF	N	RE MC,LE PSC	12	PVD C VIT DEG
230	Saratha	60/F	16041	HM +	N	RE MC,LE PSEU	12	N
231	Sudha	62/F	16041	NO PL	RAPD	RE MC,LE PSEU	4	RD
232	Ponnikamu	60/F	16196	CFCF	N	RE MC,LE PSC	14	VIT DEG
233	Immanuvel	50/M	16910	CFCF	N	RE MC,LE N	16	N
234	Kasimbee	60/M	17215	PL+	N	RE HMC,LE PSC	28	PVD
235	Prakash	65/M	17787	PL+	N	RE MC,LE PSC	12	N
236	Saraswathi	63/M	19066	CFCF	N	BE NS IV	12	PVD
237	Rani	60/F	19014	PL+	N	RE MC LE PCC	12	AST HYAL
238	Muneemal	80/F	19077	HM +	N	RE Int. lens,LE PCC	26	N
239	Muthammal	70/F	19296	HM +	N	LE NS IV,RE PSC	14	VIT DEG
240	Muniyammal	68/F	19077	PL+	N	LE NS IV,RE PSC	14	N
241	Venkatesh	80/M	124128	PL+	N	LE MC,RE PSC	16	AST HYAL

242	Rani	50/F	19287	CFCF	N	RE NSIV,LE PCC	12	VIT DEG
243	Nagoor	65/M	19612	PL+	N	LE NS IV,RE PCC	12	N
244	Chinnadurai	62/M	19755	1 / 60	N	LE MC,RE PCC	12	VIT DEG
245	Meenaboy	60/F	19759	HM +	N	LE MC,RE PSC	14	N
246	Chellammal	50/F	19794	HM +	N	LE MC,RE PSC	14	N
247	Radha	60/F	19780	PL+	N	LE MC,RE PSC	12	N
248	Velayutham	55/M	4175	CFCF	N	LE MC,RE PSC	12	PVD
249	Rajamani	60/F	4667	CFCF	N	LE MC,RE PSEU	14	PVD
250	Jeeva	56/M	7212	1 / 60	N	LE MC,RE PCC	14	PVD
251	Chellammal	65/F	4963	PL+	N	LE MC,RE PCC	14	VIT DEG
252	Arjunam	30/F	4846	NO PL	N	RE-TRAU CAT,LE PCC	14	IOFB
253	Velayutham	55/M	4549	PL+	N	LE MC,RE PSEU	16	VIT DEG
254	Aliyappan	61/M	9212	NO PL	RAPD	RE MC,LE PCC,RE PCC	6	RD
255	Saraswathi	10/F	4551	PL+	N	RE Cong CAT,LE N	16	N
256	Shanmugam	60/M	5247	CFCF	N	RE MC,LE PSC	14	PVD
257	Saroja	60/F	5112	HM +	N	LE-MC ,RE-PCC	14	PVD
258	Rameshkumar	64/M	5654	HM +	N	RE NS IV,LE PSC	12	N
259	Nandhakumar	70/M	5511	HM +	N	LE MC,RE PSEU	12	N
260	Lakshmi	60/F	5666	CFCF	N	LE MC,RE PSC	14	PVD
261	Pushpa	51/F	5543	1 / 60	N	RE NS IV,LE PSC	14	VIT DEG
262	Saraswathi	60/F	4551	HM +	N	RE MC,LE PSC	12	N
263	Muniyammal	60/F	5887	PL+	N	RE NSIV,LE PCC	22	N
264	Muniappan	72/M	5243	PL+	N	RE MC,LE PSC	12	VIT DEG
265	Valliammal	70/F	6385	PL+	N	RE NS IV,LE PCC	14	VIT DEG
266	Alamelu	60/F	7140	PL+	N	RE MC,LE PSC	14	N
267	Mohan	72/M	2087	HM +	N	LE MC,RE PSEU	16	N
268	Bamabee	65/F	7175	HM +	N	LE HMC,RE PSC	26	N
269	Palani	68/M	7875	CFCF	N	LE MC,RE PCC	10	N
270	Rani	60/F	7217	1 / 60	N	LE MC,RE PSC	12	N
271	Pandian	66/M	32741	CFCF	N	LE MC,RE PCC	12	N
272	Harikrishnan	63/M	2674	CFCF	N	LE MC,RE PSC	12	N
273	Gandasamy	62/M	2015	1 / 60	N	RE MC,LE PSC	14	N
274	Rani	60/F	2649	PL+	N	LE MC,RE PCC	14	N
275	Chandran	70/M	46678	PL+	N	RE MC,LE PSC	10	PVD C VIT DEG
276	Mariammal	46/F	2773	PL+	N	LE MC,RE PCC	10	N
277	Paran Jothi	65/F	2897	HM +	N	RE MC,LE PCC	10	VIT DEG
278	Chandran	65/M	2805	HM +	N	RE HMC,LE PSC	22	N
279	Rajendran	50/M	2646	CFCF	N	RE NS IV,LE PSC	12	N
280	Manoharan	38/M	2791	CFCF	N	LE MC,RE PSC	16	N
281	Palayam	65/M	2813	NO PL	RAPD	BE MC	4	RD
282	Victoria	65/F	3056	HM +	N	RE MC,LE PSC	16	VIT DEG
283	Poonathammal	60/F	3556	HM +	N	LE Int. lens,RE PSC	24	N
284	Ramya	50/M	30179	CFCF	N	RE NS IV,LE N	12	N
285	Geetha	29/F	18387	CFCF	N	LE- complic cat,RE N	14	PVD
286	Chakharaj	62/M	3670	1 / 60	N	RE MC,LE PCC	12	VIT DEG
287	Munusamy	70/M	4169	HM +	N	RE MC,LE PSC	16	N
288	Victoria	65/F	3056	PL+	N	LE- complic cat,RE N	16	PVD
289	Radha	65/F	4188	PL+	N	RE MC,LE PSC	14	N
290	Megathammal	70/F	4182	PL+	N	RE NS IV,LE PSC	14	N
291	Lalitha	68/F	5016	HM +	N	RE NS IV,LE PCC	12	VIT DEG
292	Siva	60/M	72120	HM +	N	LE MC,RE PSC	12	N
293	Sathiya	68/F	72121	PL+	N	LE MC,PE PSC	16	N
294	Ellammal	68/F	19754	HM +	N	LE MC,RE PCC	14	VIT DEG
295	Muthammal	70/F	19296	PL+	N	LE MC,RE PCC	12	N
296	Vaidegi	70/F	20042	PL+	N	RE MC,LE PCC	12	VIT DEG
297	Gandhan	69/M	19953	HM +	N	LE MC,RE PSC	12	N
298	Ramanugam	65/M	19979	NO PL	RAPD	RE NS IV,LE PSC	6	RD
299	Mumtaj	60/F	20483	CFCF	N	LE MC,RE PCC	14	N
300	Anand	60/M	20417	PL+	N	RE NS IV,LE PSEU	14	Post Staph
301	Thangam	60/F	20418	HM +	N	RE MC,LE PCC	16	PVD
302	Neela	55/F	20394	NO PL	N	LE NS IV,RE PSC	16	N
303	Jegatheswari	65/F	20389	CFCF	N	LE MC,RE PSC	18	PVD
304	Kothandam	72/M	20770	PL+	N	RE NS IV,LE PSC	12	N
305	Mayawathi	61/F	20419	CFCF	N	LE MC,RE PCC	12	PVD C VIT DEG
306	Palaiyan	80/M	20756	PL+	N	LE MC,RE PSC	14	VIT DEG
307	Mariammal	60/F	21023	NO PL	N	LE-MC ,RE-PCC	16	PVD

308	Devid	60/M	20618	CFCF	N	LE NS IV,RE PSC	14	N
309	Abdul Rahim	65/M	19932	HM +	N	RE MC,LE PSC	12	VIT DEG
310	Sundar	55/F	21499	1 / 60	N	LE Int. lens,RE PSC	18	N
311	Jeya	60/F	20391	PL+	N	LE NS IV,RE PCC	14	N
312	Angalai	72/F	21324	HM +	N	RE Int. lens,LE PSC	18	N
313	Natcharam	70/M	22431	PL+	N	RE HMC,LE PCC	22	N
314	Elumalai	70/M	21779	HM +	N	LE MC,RE PSC	12	VIT DEG
315	Shanmugam	65/M	20989	PL+	N	LE NS IV,RE PSC	12	VIT DEG
316	Umapathy	62/M	20232	HM +	N	RE NS IV,LE PCC	14	N
317	Kannppan	63/M	20774	CFCF	N	LE MC,RE PSEU	14	N
318	Rosy	60/F	20480	PL+	N	LE MC,RE PCC	12	N
319	Tharabee	65/F	21557	PL+	N	RE NS IV,LE PSC	12	PVD
320	Indhira	65/F	22106	HM +	N	LE MC,RE PCC	12	N
321	Shankar	62/M	25321	CFCF	N	RE MC,LE PSC	12	PVD C VIT DEG
322	Poobathiammal	63/F	22613	PL+	N	RE HMC,LE PCC	28	N
323	Mary	60/F	22620	NO PL	RAPD	RE MC,LE PSC	6	RD
324	Kangavalli	73/F	22596	HM +	N	RE MC,LE PSC	14	N
325	Aizhabeevi	70/F	22601	HM +	N	RE MC,LE PCC	18	PVD C VIT DEG
326	Vativel	60/F	22613	CFCF	N	LE NS IV,RE PSEU	16	N
327	Samandan	67/M	22807	PL+	N	RE MC,LE PSC	16	N
328	Rukkumani	65/F	24136	HM +	N	RE MC,LE PSC	14	N
329	Natarajan	75/M	24172	PL+	N	RE NS IV,LE PSC	12	N
330	Mariammal	61/F	24175	HM +	N	RE MC,LE PSC	16	VIT DEG
331	Subbulakshmi	60/F	24790	PL+	N	LE MC,RE PCC	12	N
332	Geetha	71/F	24750	PL+	N	RE NSIV,LE PSC	26	N
333	Sagunthala	60/F	23896	HM +	N	LE-MC ,RE-PCC	16	N
334	Prema	80/F	25063	1 / 60	N	LE-MC ,RE-PCC	12	N
335	Chinnamma	75/F	172550	HM +	N	LE-MC ,RE-PCC	14	VIT DEG
336	Rajammal	70/F	25226	NO PL	3mm SL	LE-MC ,RE-PCC	4	RD
337	Megalai	60/F	25538	CFCF	N	RE NS IV,LE PSC	14	PVD C VIT DEG
338	Angammal	55/F	26181	HM +	N	RE NS IV,LE PSC	16	N
339	Veniammal	65/F	28613	HM +	N	RE NS IV,LE PCC	14	PVD
340	Rani	62/F	28473	HM +	N	LE-MC ,RE-PCC	14	VIT DEG
341	Manimuthu	60/M	28897	PL+	N	RE Int. lens,LE PCC	30	N
342	Natarajan	78/M	28897	PL+	N	LE MC,RE PSC	12	PVD
343	Munusamy	64/M	29012	PL+	N	LE HMC,RE PSEU	28	VIT DEG
344	Shanmugam	60/M	29256	1/2 / 60	N	LE MC,RE PCC	12	VIT DEG
345	Elumalai	76/M	29273	CFCF	N	LE MC,RE PSC	14	N
346	Neelamma	60/F	28897	CFCF	N	LE MC,RE PSC	14	N
347	Marimuthu	60/M	28892	HM +	N	LE MC,RE PCC	12	N
348	Govindamaml	60/F	30426	HM +	N	LE NS IV,RE PSC	12	N
349	Ramasamy	70/M	30762	PL+	N	LE MC,RE PCC	14	N
350	Muthuraj	60/M	30722	PL+	N	LE MC,RE PSEU	14	N
351	Neela	50/F	26195	HM +	N	RE NS IV,LE N	12	N
352	Lakshmi	65/F	27060	NO PL	RAPD	RE MC,LE PSC	4	RD
353	Muniyammal	70/F	27245	HM +	N	RE NS IV,LE PSC	14	PVD
354	Abdul Sethu	55/M	26851	HM +	N	RE MC,LE PSC	14	PVD
355	Marimuthu	67/F	28892	CFCF	N	LE MC,RE PSEU	12	N
356	Kavitha	60/F	28845	PL+	N	LE MC,RE PSC	12	N
357	Gajalakshmi	60/F	18658	CFCF	N	RE MC,LE PSC	14	PVD
358	Jayamani	85/F	234568	HM +	N	RE NS IV,LE PCC	18	N
359	Gerald	52/M	346648	HM +	N	LE-MC ,RE-PCC	8	VIT HGE
360	Mariammal	55/F	346649	CFCF	N	RE MC LE PCC	6	N
361	Sundar	45/M	27311	CFCF	N	LE- complic cat,RE N	12	PVD
362	Habeeba	70/F	260620	HM +	N	RE-MC, LE-pseu	14	VIT HGE
363	Mallika	50/F	28418	PL+	N	LE-MC ,RE-PCC	6	PVD
364	Bagyalakshmi	50/F	24698	HM +	N	RE MC LE PCC	14	N
365	Devika01	35/F	28401	No PL	3mm SL	LE-MC ,RE-PCC	4	RD
366	Ponmani	60/F	52115	CFCF	N	RE MC LE PCC	6	N
367	Punniamani	58/F	52115	CFCF	N	RE NS IV,LE N	12	PVD
368	Mahendar	35/F	261332	PL+	N	LE-MC ,RE-PCC	6	N
369	Annalakshmi	60/F	28959	NO PL	RAPD	RE-MC LE-PSC	4	RD
370	Valliammal	65/F	28473	PL+	N	RE MC LE PCC	14	N
371	Suresh kumar	60/M	29590	HM +	N	LE-MC ,RE-PCC	16	N
372	Annalakshmi	69/F	32250	HM +	N	RE MC LE PCC	16	N
373	Desam	53/M	32251	HM +	N	LE-MC ,RE-PCC	18	N
374	Kannamal	70/F	35047	PL+	N	BE, NS-IV	12	PVD
375	k begum	60/F	35427	HM +	N	LE-MC ,RE-PCC	14	N

376	Rajeswari	60/F	320591	HM +	N	BE-NS IV	14	N
377	Murthy	42/M	36654	NO PL	RAPD	LE- complic cat,RE N	4	RD
378	Dharman	50/M	39903	HM +	N	RE MC,LE PCC	18	N
379	Thangam	70/F	52679	PL+	N	BE MC	14	PVD
380	Muniyandi	80/M	42729	PL+	N	LE-MC ,RE-PCC	16	N
381	Manickam	70/M	55478	NO PL	RAPD	RE-MC LE-PSC	4	RD
382	Gowri	40/F	353214	NO PL	RAPD	RE-TRAU CAT,LE Norm	4	RD
383	Mahendran	36/M	43727	NO PL	RAPD	RE-TRAU CAT,LE Norm	4	RD
384	Kanniamal	57/F	44171	CFCF	N	LE Int lens RE PCC	16	N
385	Ganesan	62/M	44563	NO PL	RAPD	RE-MC LE-PSC	4	N
386	Selvam	48/M	45338	HM +	N	LE-MC ,RE-PCC	14	N
387	Murugesan	62/M	43837	PL+	N	RE MC LE PCC	14	N
388	Anandi	60/F	575049	HM +	N	BE-NS IV	16	AST HYAL
389	Vani	60/F	702153	PL+	N	RE MC LE PCC	18	N
390	Saravana kumar	56/M	602924	CFCF	N	LE-MC ,RE-PCC	14	PVD
391	Selvi	75/F	22695	NO PL	N	LE NS IV RE PCC	4	IOFB
392	Manoharan	58/M	27915	HM +	N	LE -MC RE-PCC	16	N
393	Sivaraj	61/M	96239	CFCF	N	RE MC LE PCC	18	N
394	Antony	28/M	26914	NO PL	RAPD	RE-MC LE-PSC	4	RD
395	Rosammal	60/F	38371	PL+	N	RE MC LE PCC	16	N
396	Muthusamy	30/F	50108	PL+	N	RE-Normal LE-Trau Cat	12	VIT HGE
397	Muniammal	60/F	58875	HM +	N	RE MC LE PCC	14	N
398	Anjalai	60/F	66345	CFCF	N	RE MC LE PCC	20	N
399	Rani	60/F	46995	PL+	N	RE HMC,LE PSC	20	VIT HGE
400	Rajammal	49/F	7614	CFCF	N	RE MC LE N	20	N
401	Kousalya	61/F	85915	HM +	N	RE MC LE PCC	18	N
402	Kandasamy	70/M	75828	NO PL	RAPD	RE MC,LE PSC	4	RD
403	Rajammal	50/F	58745	HM +	N	RE-mc LE-PSC	12	ONH COLOB
404	Kala	25/F	10238	HM +	N	RE-NSIV,LE N	12	Post Staph
405	Thayammal	55/F	93605	CFCF	N	RE MC LE PCC	14	N
406	Yamuna	57/F	10237	CFCF	N	LE-MC ,RE-PCC	14	N
407	Pachaiammal	60/F	98422	PL+	N	RE MC LE PCC	12	N
408	Balu	74/M	16037	PL+	N	LE-MC ,RE-PCC	18	PVD
409	Shanmugam	55/M	16267	HM +	N	RE-MC, LE-pseu	16	N
410	Thayarammal	55/F	93605	PL+	N	RE NS IV,LE PSEU	14	N
411	Vijaykumar	45/M	18404	PL+	N	RE-NSIV,LE-PSC	4	PVD
412	Chellayan	78/M	16005	NO PL	N	LE-MC ,RE-PCC	4	Thickened posterior capsule
413	Anandan	30/M	122430	PL+	N	RE-Normal LE-Trau Cat	12	VIT HGE
414	Janakiraman	65/M	20389	PL+	N	RE HMC,LE PSEU	28	N
415	Elizabeth	41/F	19423	HM +	N	RE MC LE PCC	14	N
416	Kaliyan	45/M	10766	CFCF	N	BE MC	12	VIT DEG
417	Shanmugam	55/M	141375	HM +	N	RE HMC,LE PCC	14	N
418	Shakuntala	60/F	23896	CFCF	N	LE-MC ,RE-PCC	14	N
419	Shanthi	60/F	24590	PL+	N	LE-NSIV, RE-PSC	12	PVD
420	Sarangan	64/M	24135	HM +	N	BE-NS IV	16	N
421	Nagarajan	75/M	241742	PL+	N	RE-MC, LE-pseu	16	N
422	Sandhya	50/F	24959	PL+	N	RE-mc,LE-PSC	16	N
423	Annamal	70/F	161580	PL+	N	LE Int lens RE PCC	22	N
424	Pachai	60/M	618543	CFCF	N	RE NS IV,LE PSC	18	N
425	Alagar	50/M	17428	NO PL	N	LE-NSIV, RE-PSC	4	PVD
426	Lakshmi	35/F	32018	NO PL	N	LE-MC ,RE-PCC	4	PVD
427	Annakili	25/F	182428	NO PL	RAPD	RE-TRAU CAT,LE Norm	4	RD
428	Anandapan	55/M	182428	HM +	N	RE NS IV,LE PSC	16	N
429	Abavanan	45/M	26111	CFCF	3mm SL	RE-NSIV,LE-Trau Cat	16	N
430	Pushpa	72/F	27796	CFCF	N	LE-NSIV,RE PCC	18	N
431	Devi	60/F	24486	HM +	N	RE-mc,LE-PSC	14	PVD
432	Lakshmi	60/F	61854	HM +	N	LE Int lens RE PCC	16	N
433	Palani	70/M	61355	PL+	N	RE NS IV,LE PSC	14	N
434	Ramayee	63/F	53872	PL+	N	RE-MC, LE-pseu	16	N
435	Mayavan	50/M	23497	HM +	N	RE MC LE PCC	12	PVD
436	Gunasekar	65/M	23397	HM +	N	RE NS IV,LE PSC	14	N
437	Ramachandran	60/M	24486	NO PL	N	LE-MC ,RE-PCC	6	N
438	Padmanaban	70/M	24485	NO PL	N	LE-MC ,RE-PCC	4	N
439	Srinivasan	54/M	32018	PL+	N	LE-MC ,RE-PCC	14	N
440	Devan	65/F	409661	PL+	N	RE-MC, LE-pseu	16	N
441	Kaliyaperumal	70/M	408826	PL+	N	RE-mc,LE-PCC	14	N
442	Subramani	78/M	48487	HM +	N	LE-HMC,RE-PSC	12	PVD
443	Kannamal	68/F	63450	CFCF	N	RE-MC, LE-pseu	14	N
444	Rajesh	30/M	409946	NO PL	N	RE-NSIV, LE-N	4	N
445	Govindaraj	60/M	51962	PL+	N	LE Int lens RE PCC	18	N

446	Subrayan	50/M	42144	CFCF	N	BE MC	16	PVD
447	Selvam	66/M	51692	HM +	N	RE-MC, LE-pseu	16	N
448	Rani	55/F	36792	PL+	N	LE-MC ,RE-PCC	14	N
449	Vanitha	65/F	32011	CFCF	N	RE-mc,LE-PSC	12	AST HYAL
450	Sampath	55/M	32012	HM +	N	LE-MC ,RE-PCC	12	VIT DEG
451	Sheriff	60/M	45715	CFCF	N	BE MC	14	N
452	Chellayan	60/M	42613	PL+	N	RE NSIV,LE PSC	16	N
453	Kollapan	63/M	42707	NO PL	3mm SL	LE-MC ,RE-PCC	4	RD
454	Kaliyaperumal	72/M	64050	NO PL	N	LE-MC ,RE-PCC	28	N
455	Vijaykumar	70/M	23958	HM +	N	LE-MC ,RE-PCC	16	Thickened posterior capsule
456	Parvathi	65/F	36499	HM +	N	LE-MC ,RE-PCC	12	N
457	Velan	65/M	41759	CFCF	N	LE MC,RE PSC	12	PVD
458	Raja	60/M	4665	CFCF	N	LE MC,RE N	14	PVD
459	Jeeva	66/M	72124	1 / 60	N	LE MC,RE PSC	14	PVD
460	Arjunan	68/M	45496	PL+	N	LE MC,RE PSC	16	VIT DEG
461	Saraswathi	60/F	45516	PL+	N	LE NS IV,RE PSEU	16	N
462	Shanmugam	66//M	51125	HM +	N	RE MC,LE PCC	14	PVD
463	Saroja	60/F	51124	HM +	N	RE MC,LE PSC	12	N
464	Ganesan	61/M	45512	NO PL	RAPD	RE MC,LE PSC	6	RD
465	Muniyammal	60/F	58375	PL+	N	RE Int. lens,LE PCC	22	N
466	Valliammal	70/F	63856	PL+	N	LE MC,RE PCC	12	VIT DEG
467	Velayutham	58/M	77715	PL+	N	LE MC,RE PSC	14	VIT DEG
468	Hariram	62/M	20151	1 / 60	N	RE MC,LE PCC	12	N
469	Kandasamy	62/M	26495	PL+	N	LE NS IV,RE PSC	14	N
470	Mari	66/F	27734	PL+	N	RE MC,LE PSC	12	N
471	Paran Jothi	66/F	28925	HM +	N	RE MC,LE PSEU	16	VIT DEG
472	Palayam	65/M	28135	NO PL	RAPD	RE MC,LE PSC	4	RD
473	Victoria	65/F	30567	HM +	N	RE MC,LE PSC	16	VIT DEG
474	Ramya	60/M	30179	CFCF	N	LE NS IV,RE PSC	12	N
475	Ramu	70/M	32155	PL+	N	RE MC,LE PCC	14	VIT DEG
476	Raju	65/M	41695	HM +	N	RE Int. lens,LE PSEU	30	PVD
477	Radha	66/F	4182	HM +	N	LE NS IV,RE PSC	20	N
478	Latha	62/F	50165	PL+	N	LE NS IV,RE PSC	20	N
479	Ramu	64//M	26354	HM +	N	LE-MC ,RE-PCC	12	PVD
480	Mani	74/M	27002	HM +	N	RE NS IV,LE PCC	12	PVD
481	Baskar	72/M	75006	CFCF	N	RE NS IV,LE PSC	14	PVD
482	Devan	10/M	25931	NO PL	3mm SL	LE Cong Cat,RE N	4	RD
483	Chandra	66/F	27312	PL+	N	LE MC,RE PSC	16	AST HYAL
484	Kamala	58/F	22956	PL+	N	LE MC,RE PSC	16	AST HYAL
485	Kamala	62/F	27886	PL+	N	RE NS IV,LE PCC	16	VIT DEG
486	Annamal	70/F	27889	HM +	N	RE NS IV,LE PCC	12	VIT DEG
487	Manga	68/F	28194	PL+	N	RE NS IV,LE PSC	12	PVD
488	Nazcer	66/M	28394	PL+	N	RE NS IV,LE PSC	14	N
489	Subraj	63/M	22617	HM +	N	RE MC,LE PCC	14	N
490	Karupasamy	60/M	22918	HM +	N	RE NS IV,LE PSC	12	N
491	Senala	58/F	2414	HM +	N	RE MC,LE PSC	12	VIT DEG
492	Ismail	63/M	24136	NO PL	3mm SL	LE MC,RE PSEU	6	RD
493	Aysha bebi	66/F	20682	PL+	N	RE NS IV,LE PSC	12	AST HYAL
494	Kanagawalli	60/F	20745	CFCF	N	LE MC,RE PSC	12	AST HYAL
495	Mary	62/F	20462	CFCF	N	LE-MC ,RE-PCC	14	PVD
496	Ravikumar	72/F	25063	CFCF	N	RE MC,LE PSEU	14	PVD
497	Parvathi	70/F	25055	HM +	N	RE MC,LE PSC	16	PVD
498	Saravanan	70/M	25321	1/2 / 60	N	LE MC,RE PCC	16	VIT DEG
499	Kuppu	70/F	25097	PL+	N	BE NS IV	12	VIT HGE
500	Sekar	58/F	25517	CFCF	N	RE NS IV,LE PSC	16	AST HYAL